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Hung et al.

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(54) **ELECTRICAL CONNECTOR WITH ROBUST HEAT-DISSIPATION STRUCTURES**

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Related U.S. Application Data

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(30) **Foreign Application Priority Data**

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Jun. 12, 2014 (CN) ..... 2014 2 0310129 U

(51) **Int. Cl.**

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H01R 12/72	(2011.01)
H01R 13/41	(2006.01)
H01R 27/02	(2006.01)

(52) **U.S. Cl.**
CPC ***H01R 12/724*** (2013.01); *H01R 13/41* (2013.01); *H01R 27/02* (2013.01)

(58) **Field of Classification Search**
CPC H01R 23/7073; H01R 23/7068; H01R 23/6873; H01R 12/57
USPC 439/79, 540.1, 80, 927, 947
See application file for complete search history.

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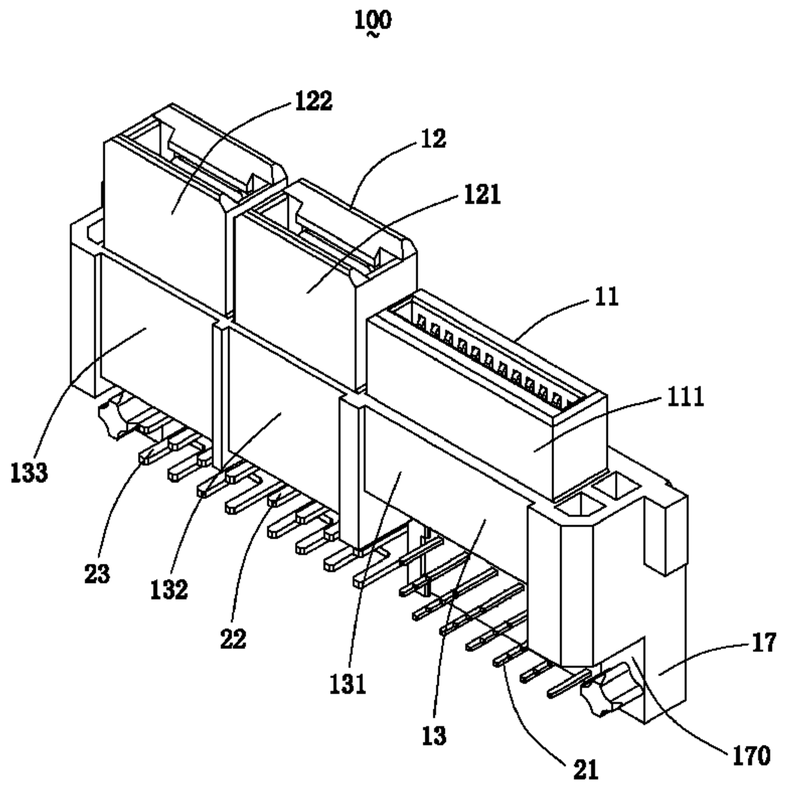
(57) **ABSTRACT**

An electrical connector includes an insulative housing and two rows of power contacts received in the insulative housing. The insulative housing includes a main body and a mating port extending from the main body. Each power contact includes a mating portion protruding into the mating port, a Z-shaped intermediate portion extending rearwardly from the mating portion and a termination portion. The insulative housing includes a first heat dissipation path extending along a first direction, a second heat dissipation path extending along a second direction perpendicular to the first direction, and a third heat dissipation path extending along a third direction perpendicular to the first direction and the second direction. The first heat dissipation path, the second heat dissipation path and the third heat dissipation path are surrounding the power contacts for heat dissipation.

20 Claims, 17 Drawing Sheets



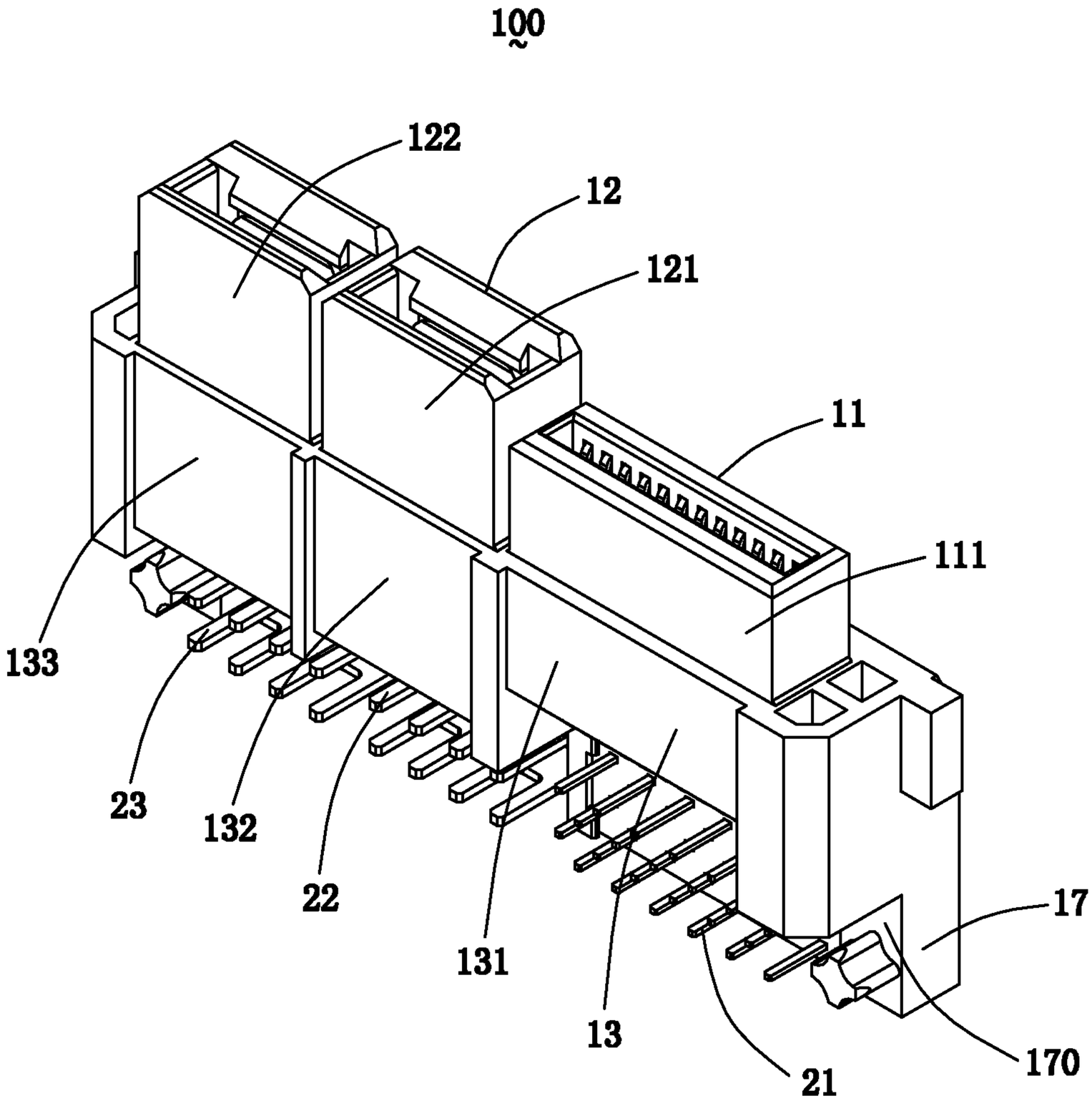


FIG. 1

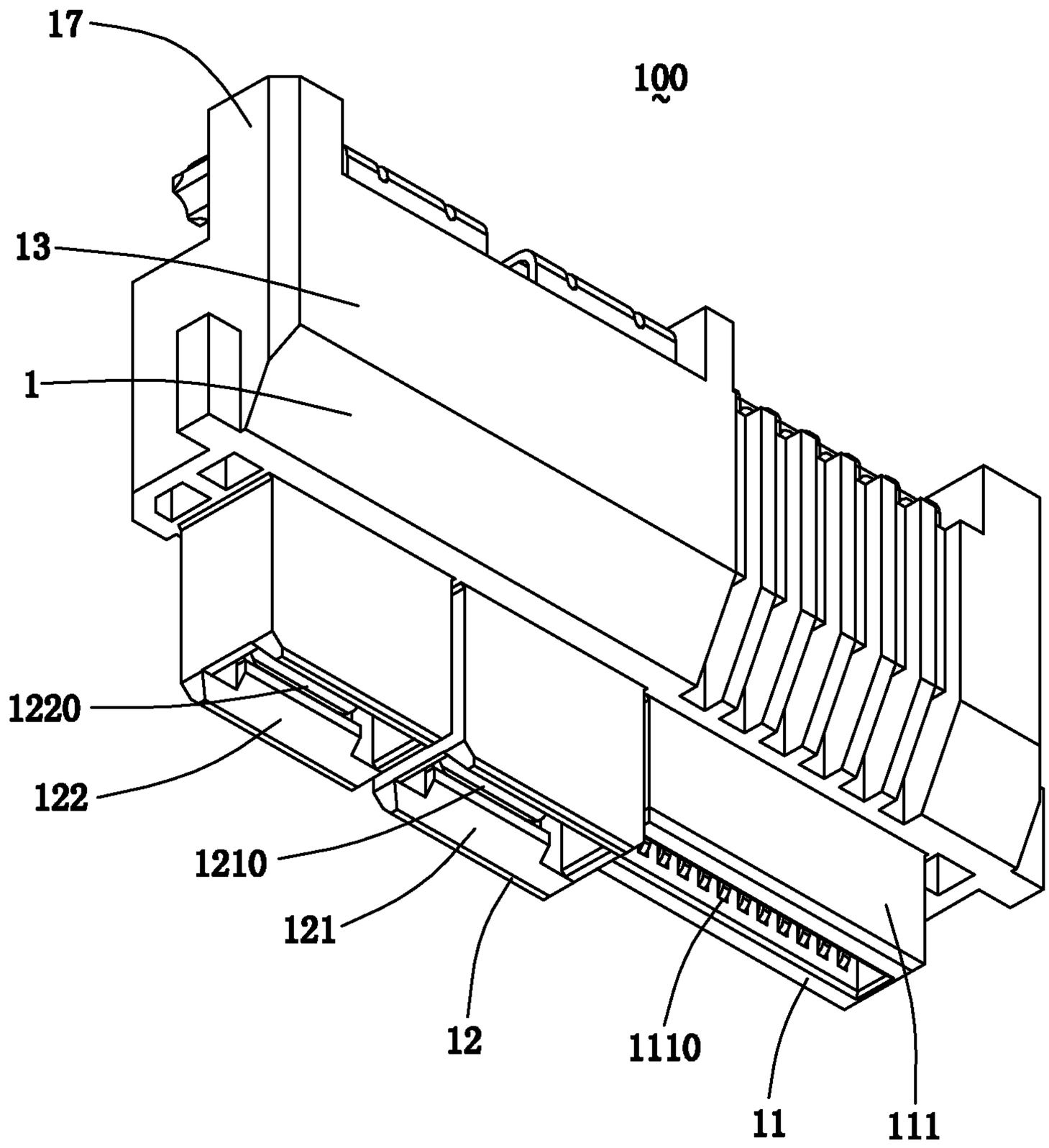


FIG. 2

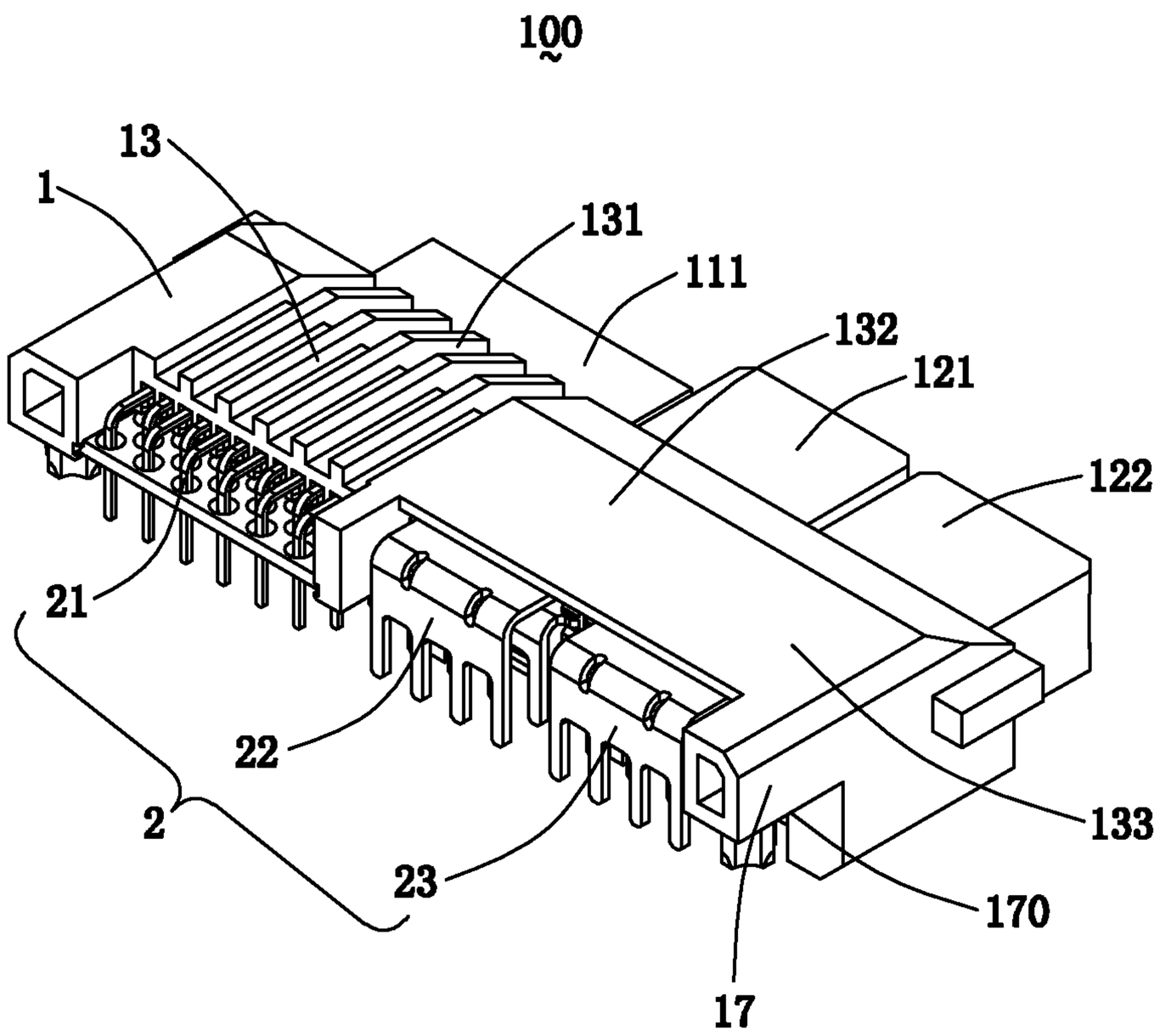


FIG. 3

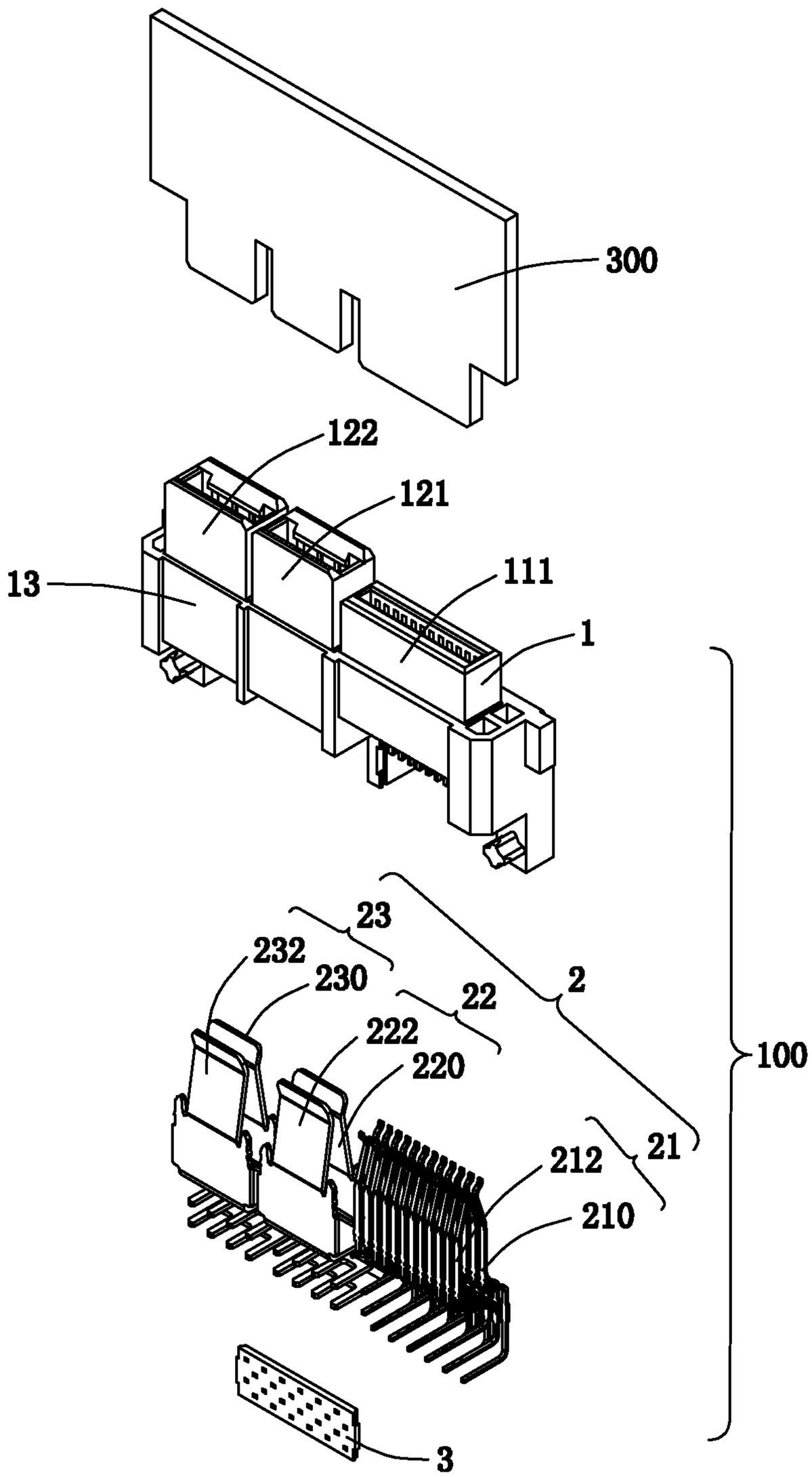
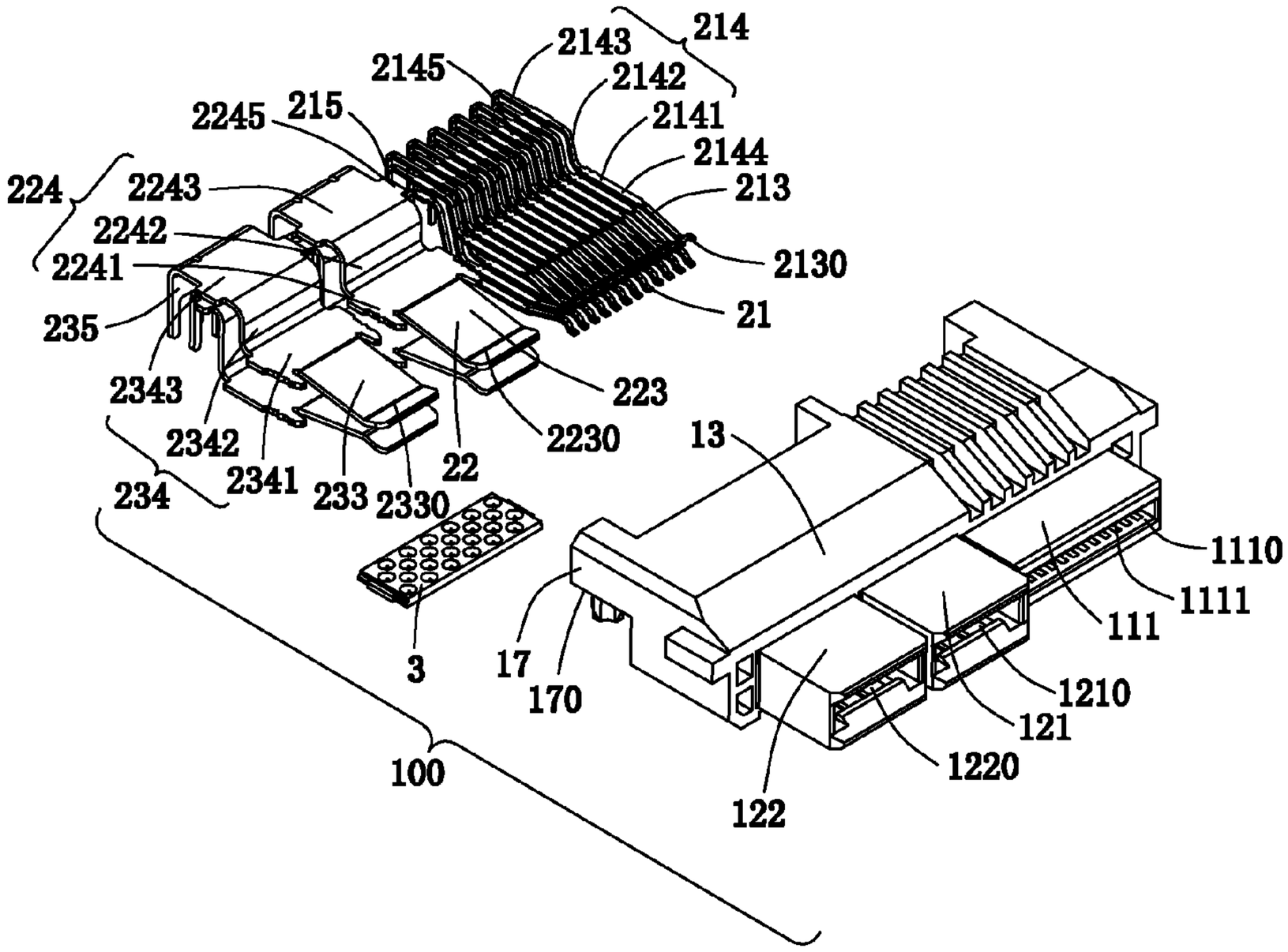


FIG. 4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2143
2145
2142
2141
2245
215
2144
224
2243
213
2242
2130
2241
21
235
223
2343
2230
2342
13
2341
233
2330
22
234
1110
1111
111
17
3
170
1210
121
1220
100
122

FIG. 5

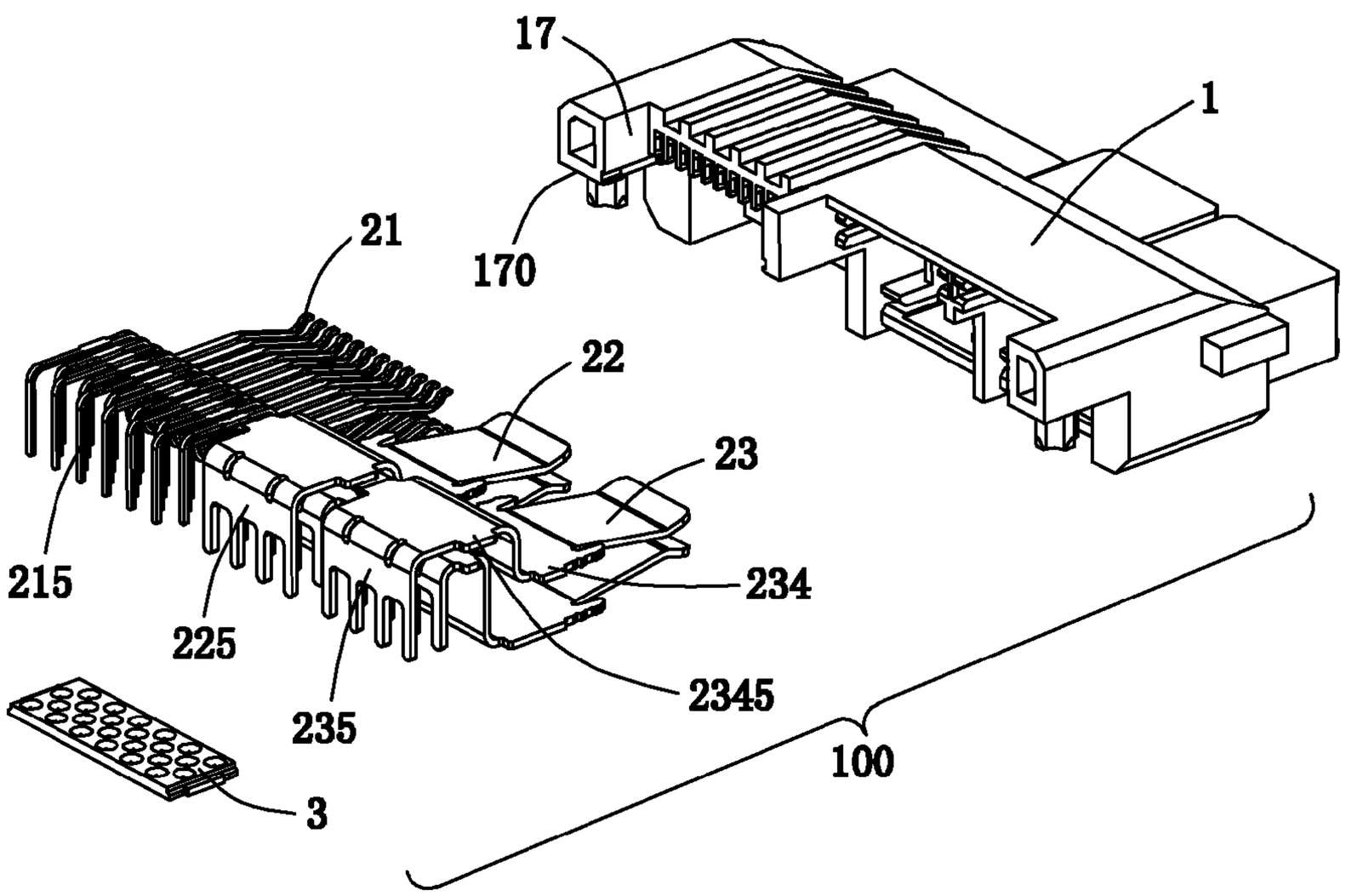

FIG. 6

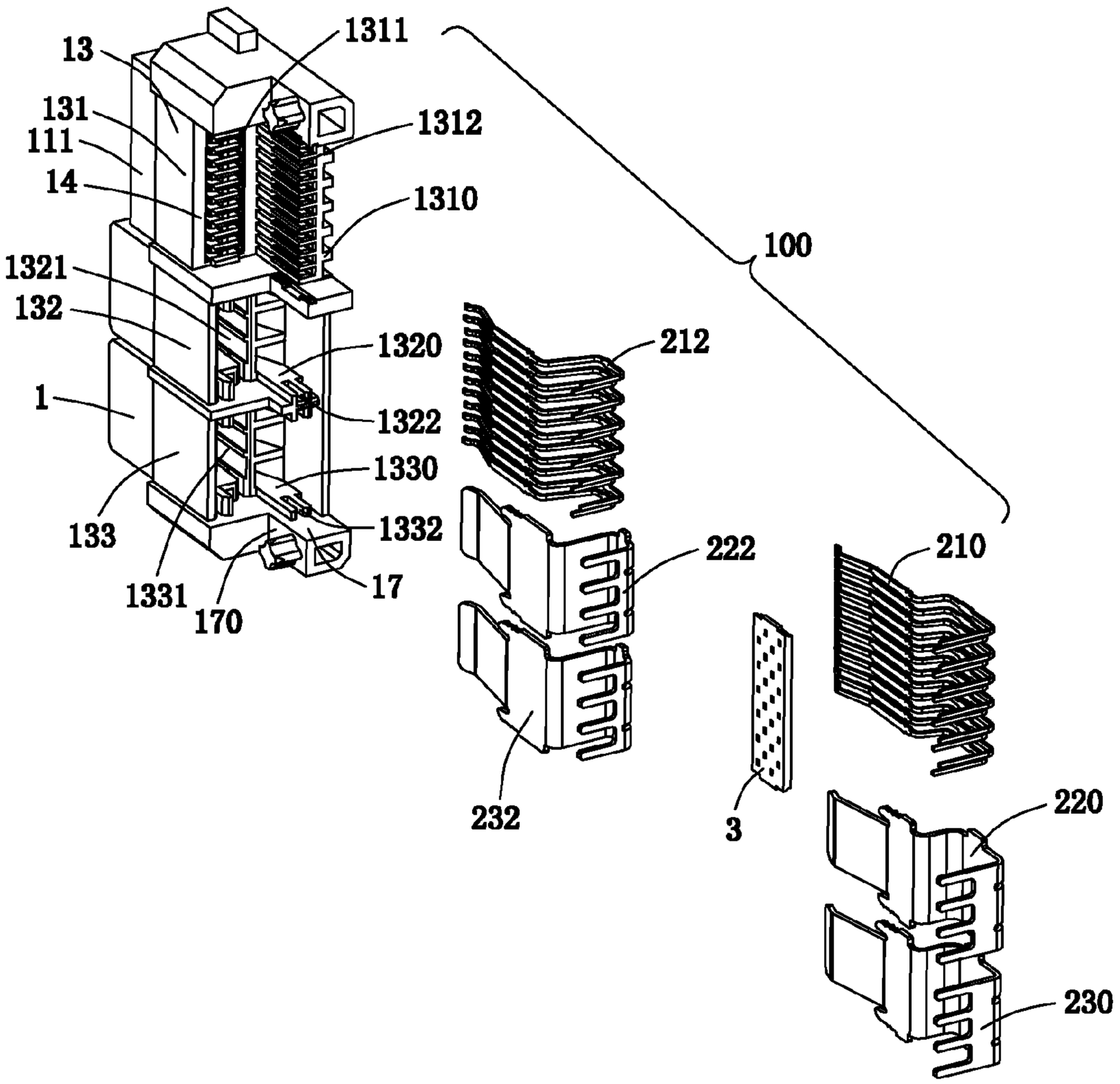
13
131
111
14
1321
132
1
133
1331
170
17
1332
1330
1322
1320
1310
1312
1311
100
212
222
232
210
3
220
230

FIG. 7

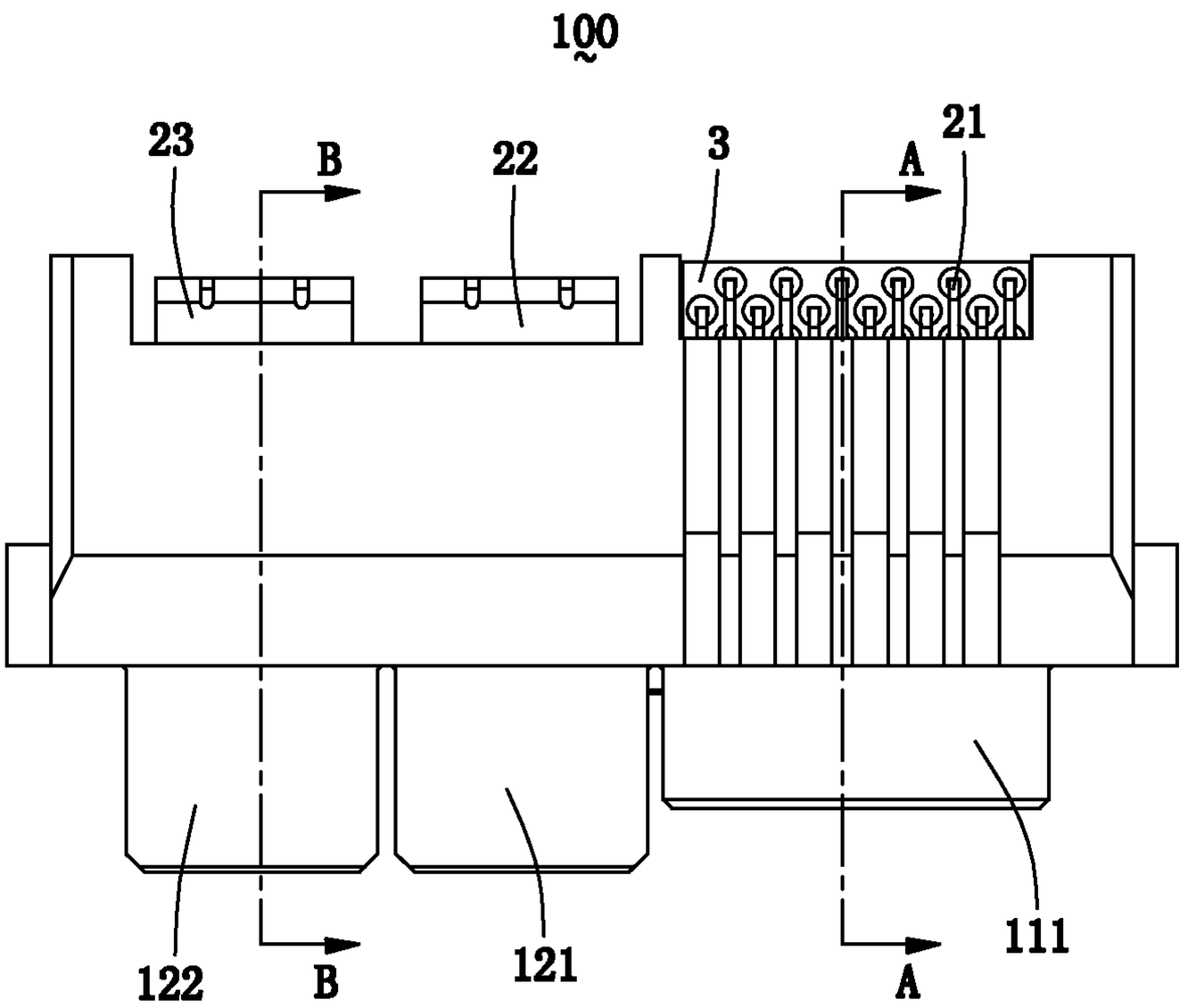
100
23
B
22
3
A
21
122
B
121
A
111

FIG. 8

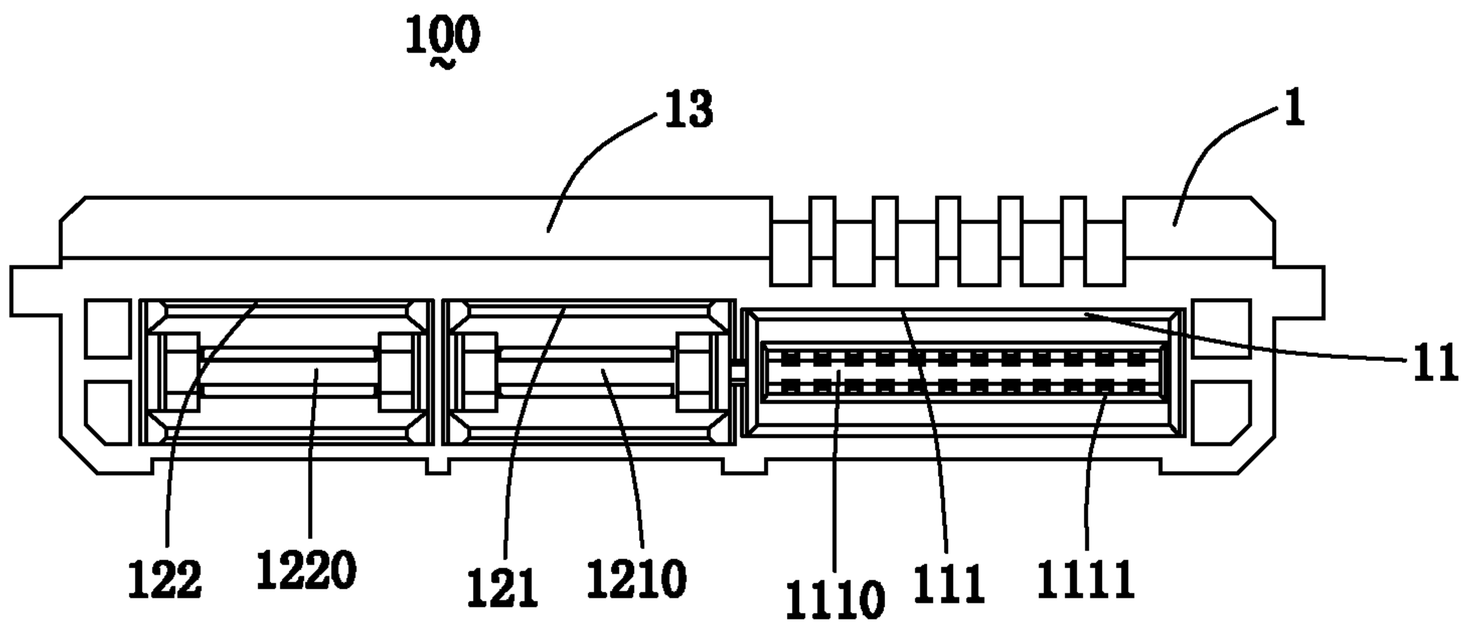
100
13
1
11
122
1220
121
1210
1110
111
1111

FIG. 9

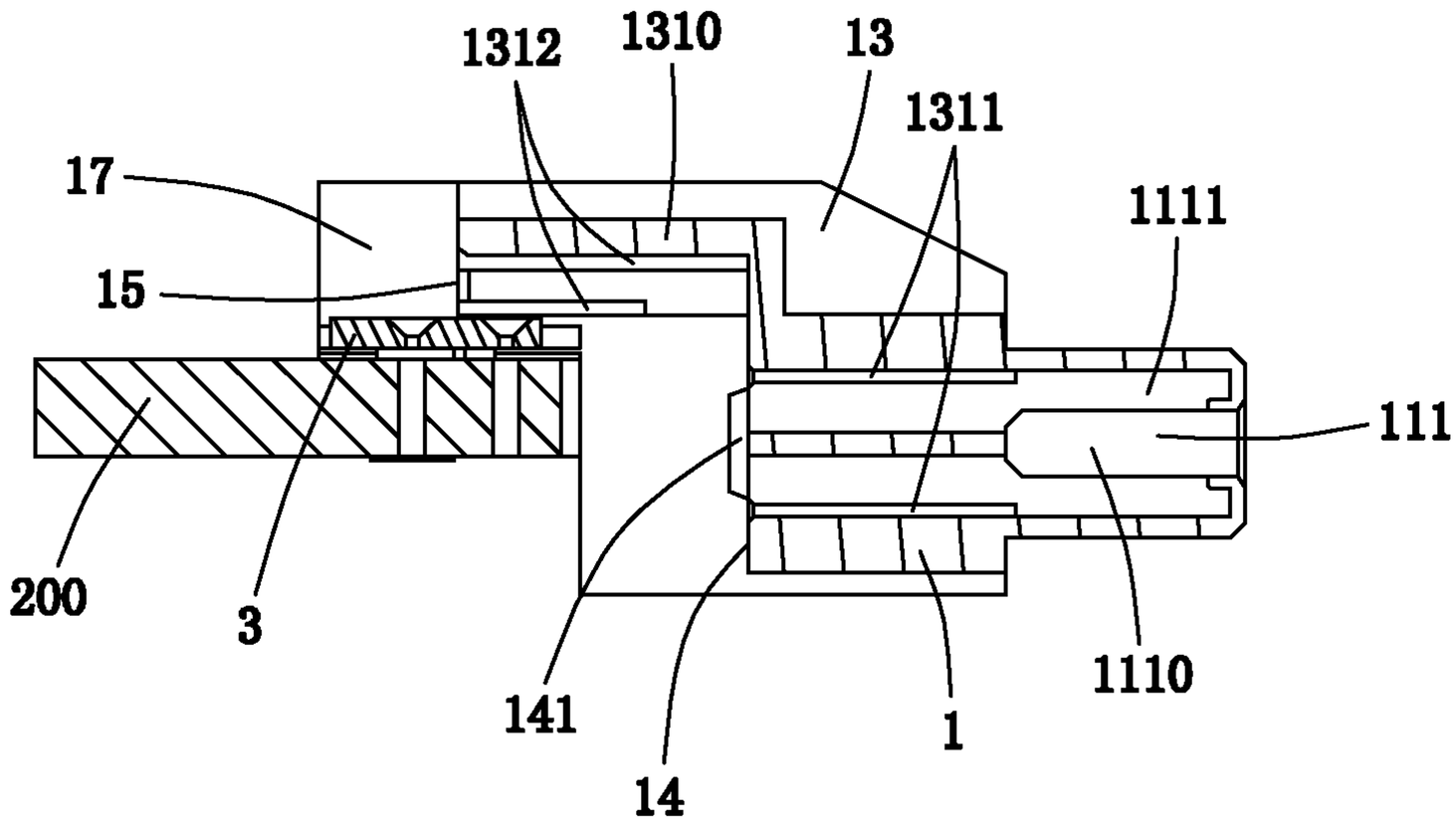
1312
1310
13
1311
17
1111
15
111
200
3
141
14
1
1110

FIG. 10

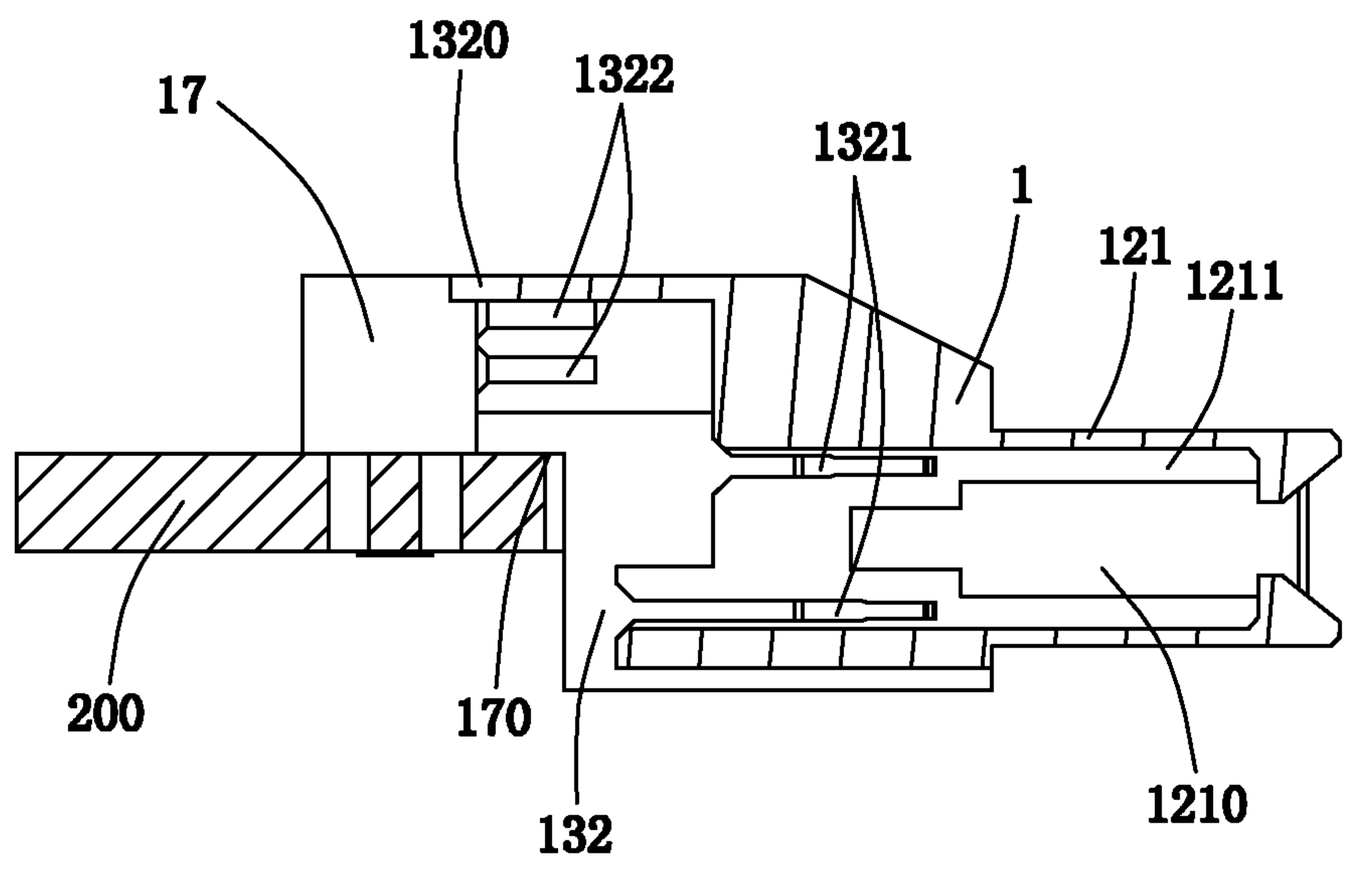
1320
1322
17
1321
1
121
1211
200
170
132
1210

FIG. 11

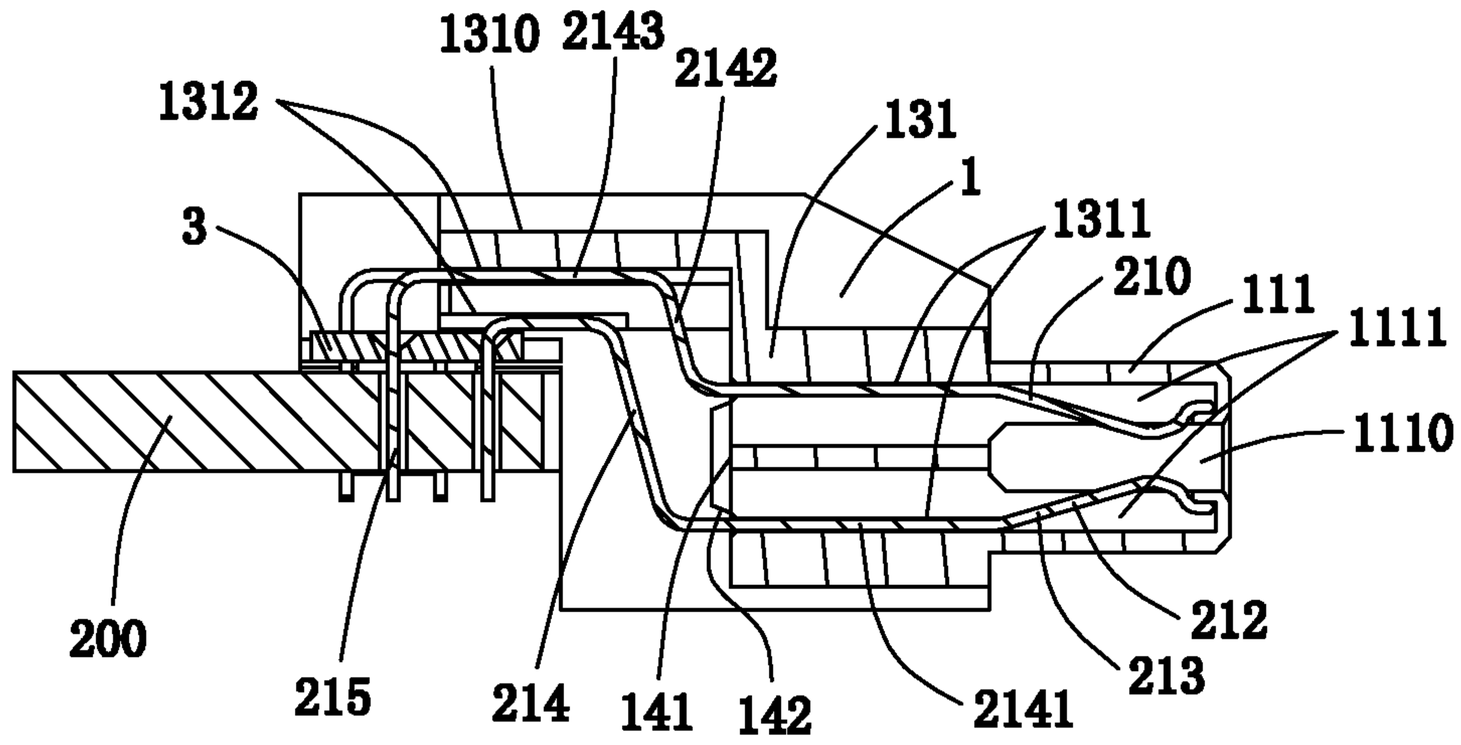
1310
2143
2142
1312
131
1
3
1311
210
111
1111
1110
212
213
200
215
214
141
142
2141

FIG. 12

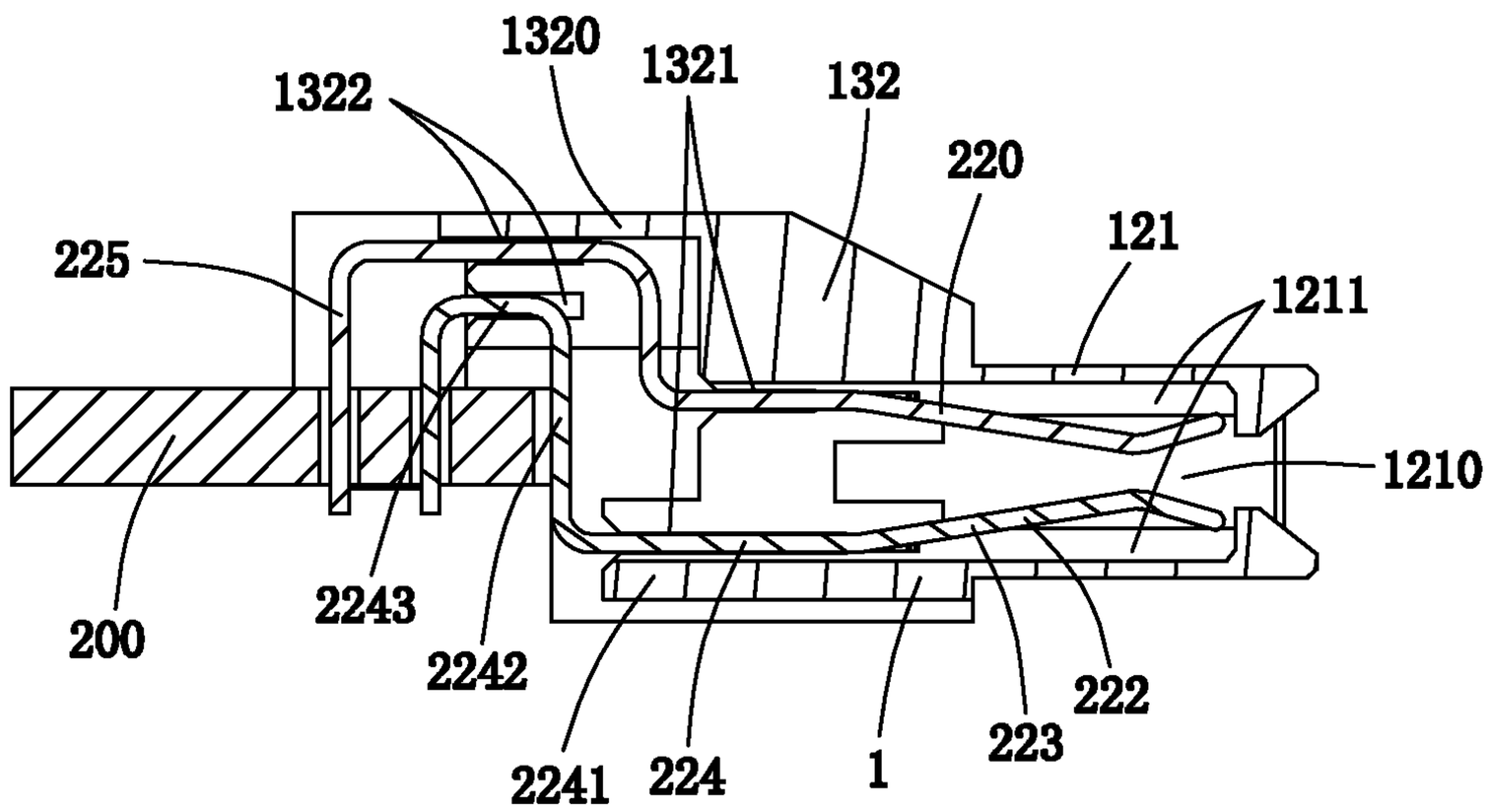
1320
1321
132
1322
220
225
121
1211
1210
200
2243
2242
2241
224
1
223
222

FIG. 13

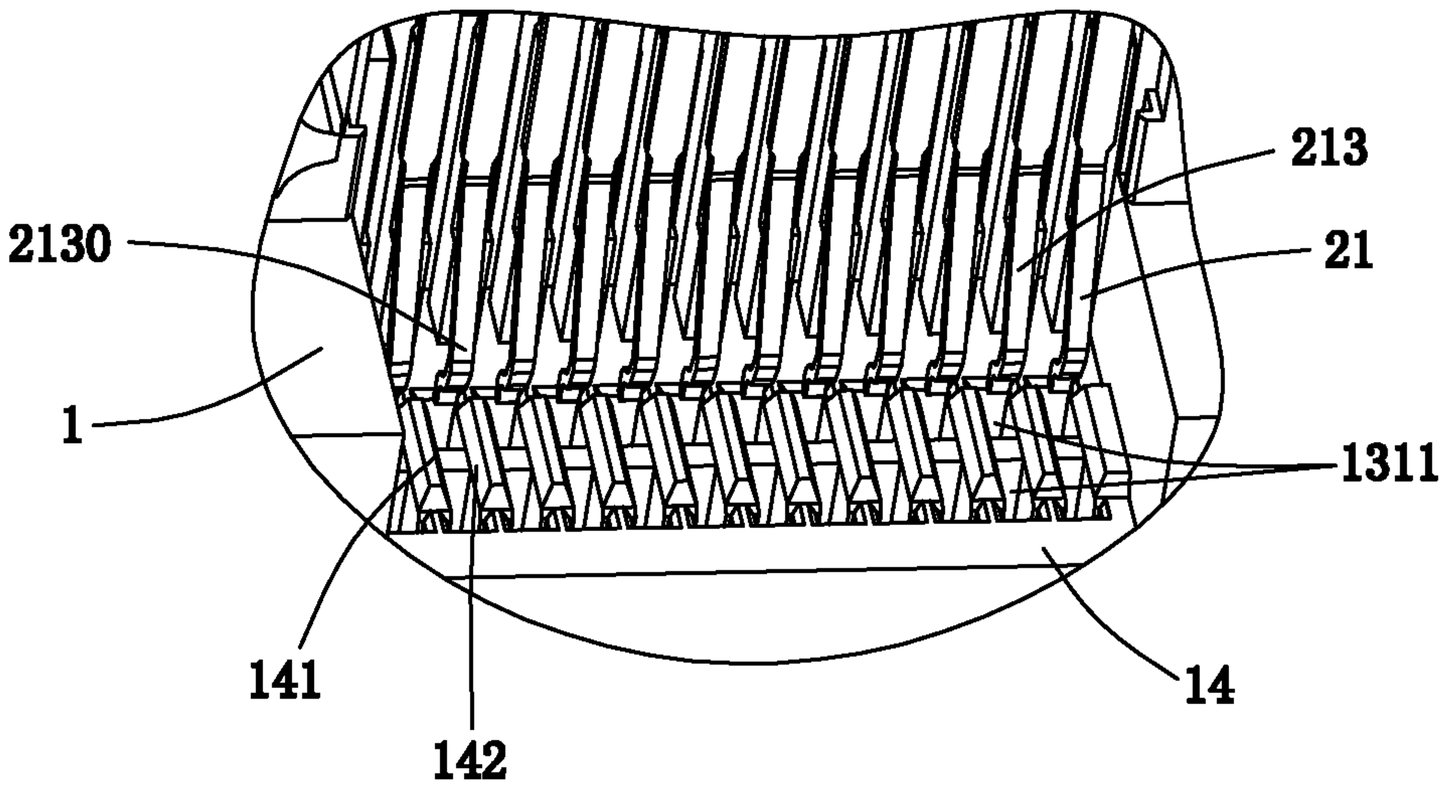

FIG. 14

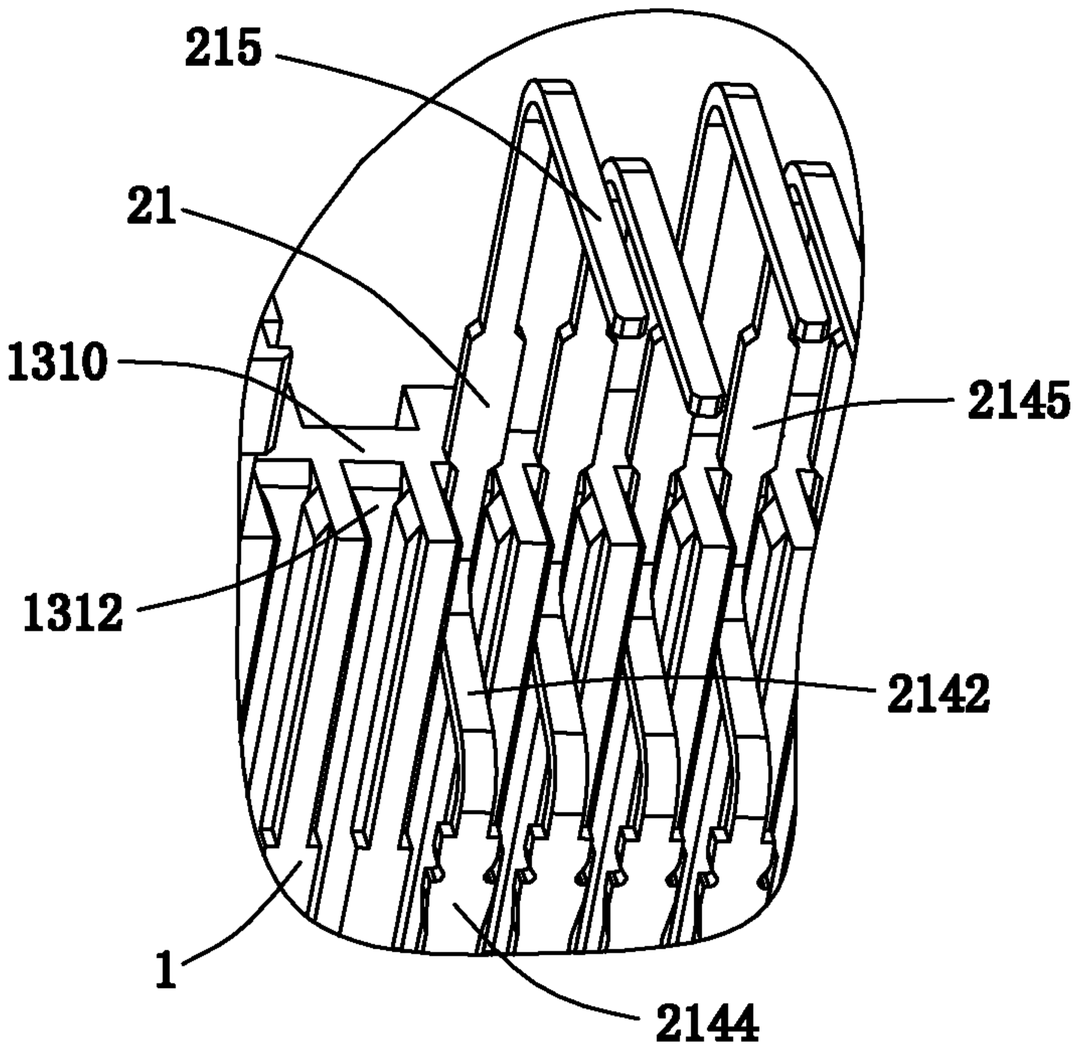

FIG. 15

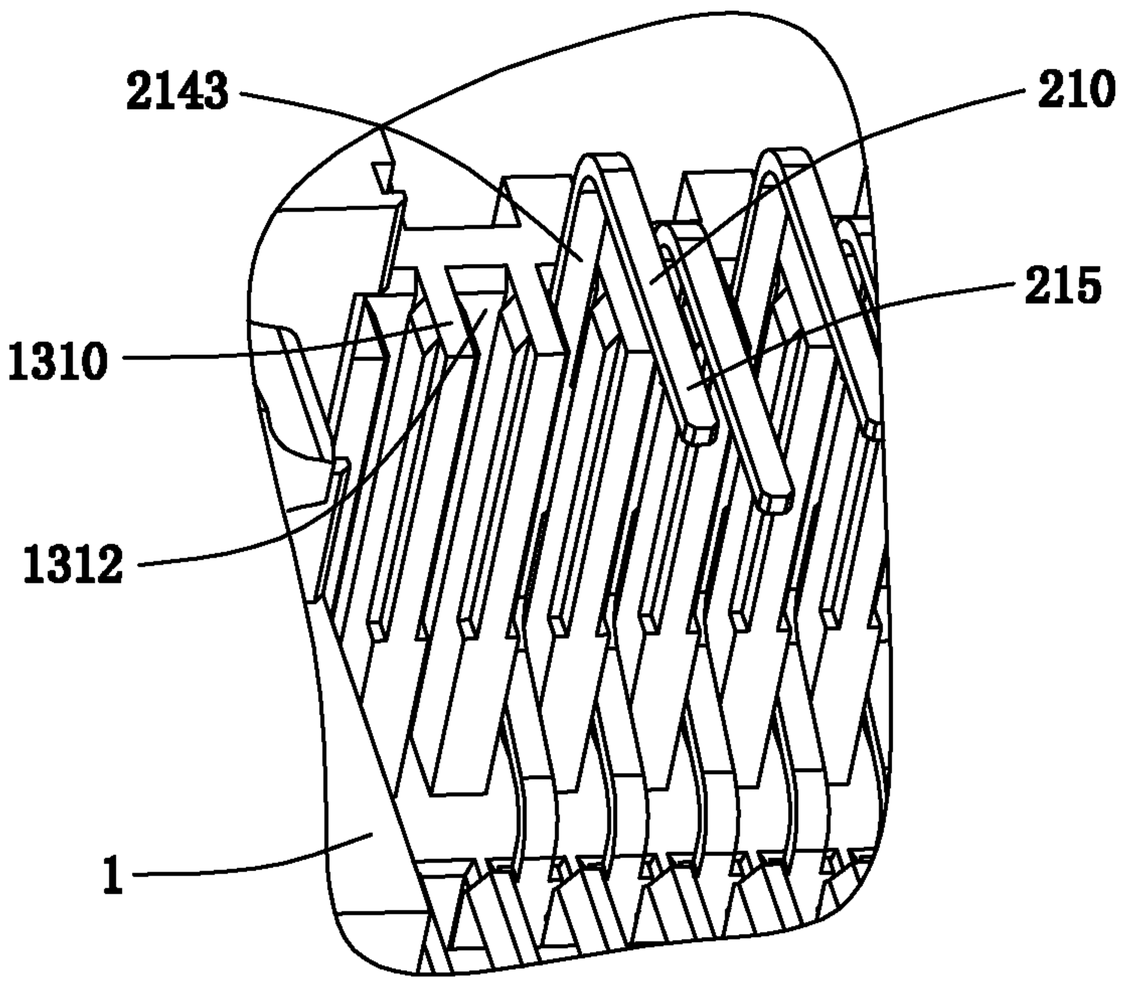
2143
210
215
1310
1312
1

FIG. 16

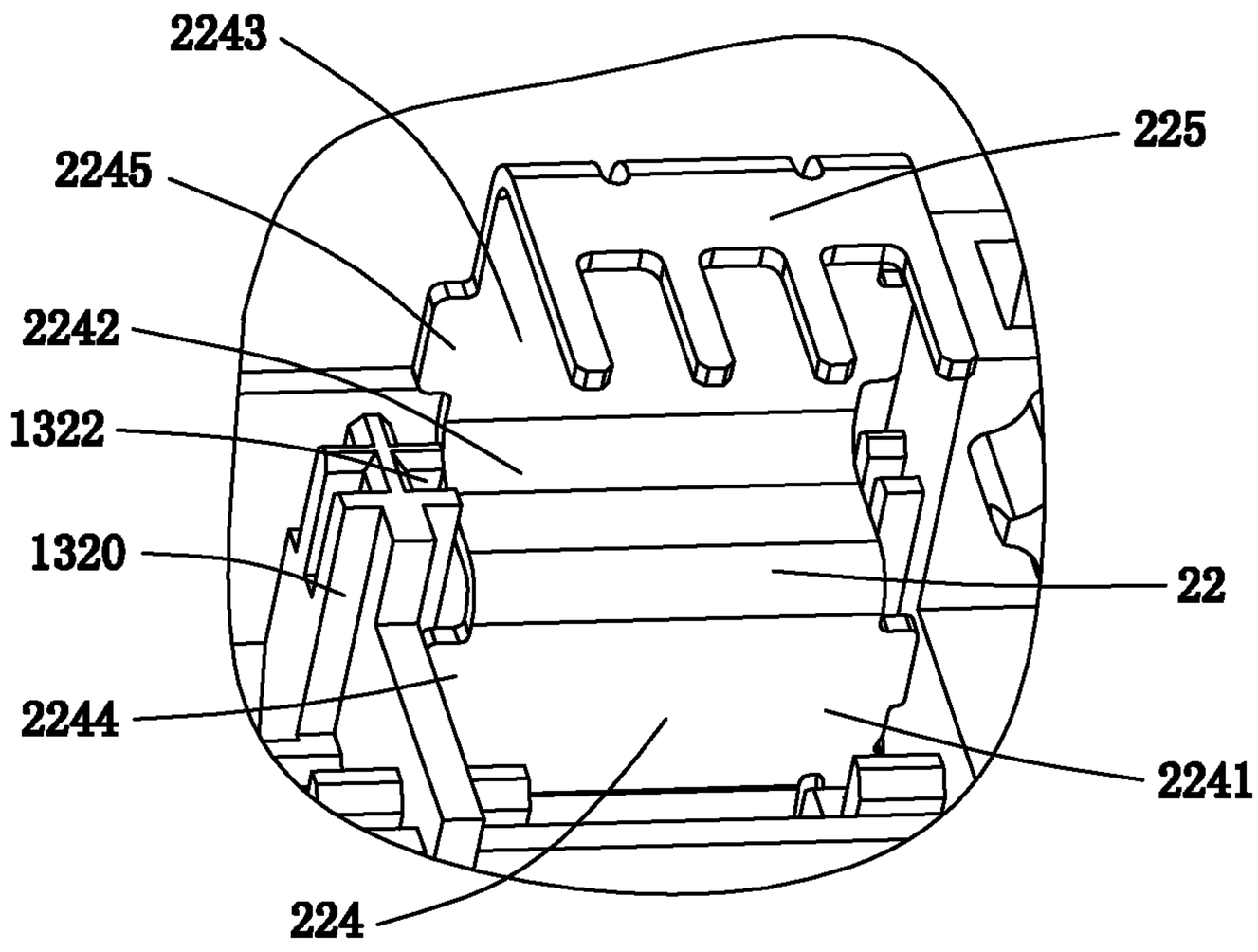
2243
225
2245
2242
1322
1320
22
2244
2241
224

FIG. 17

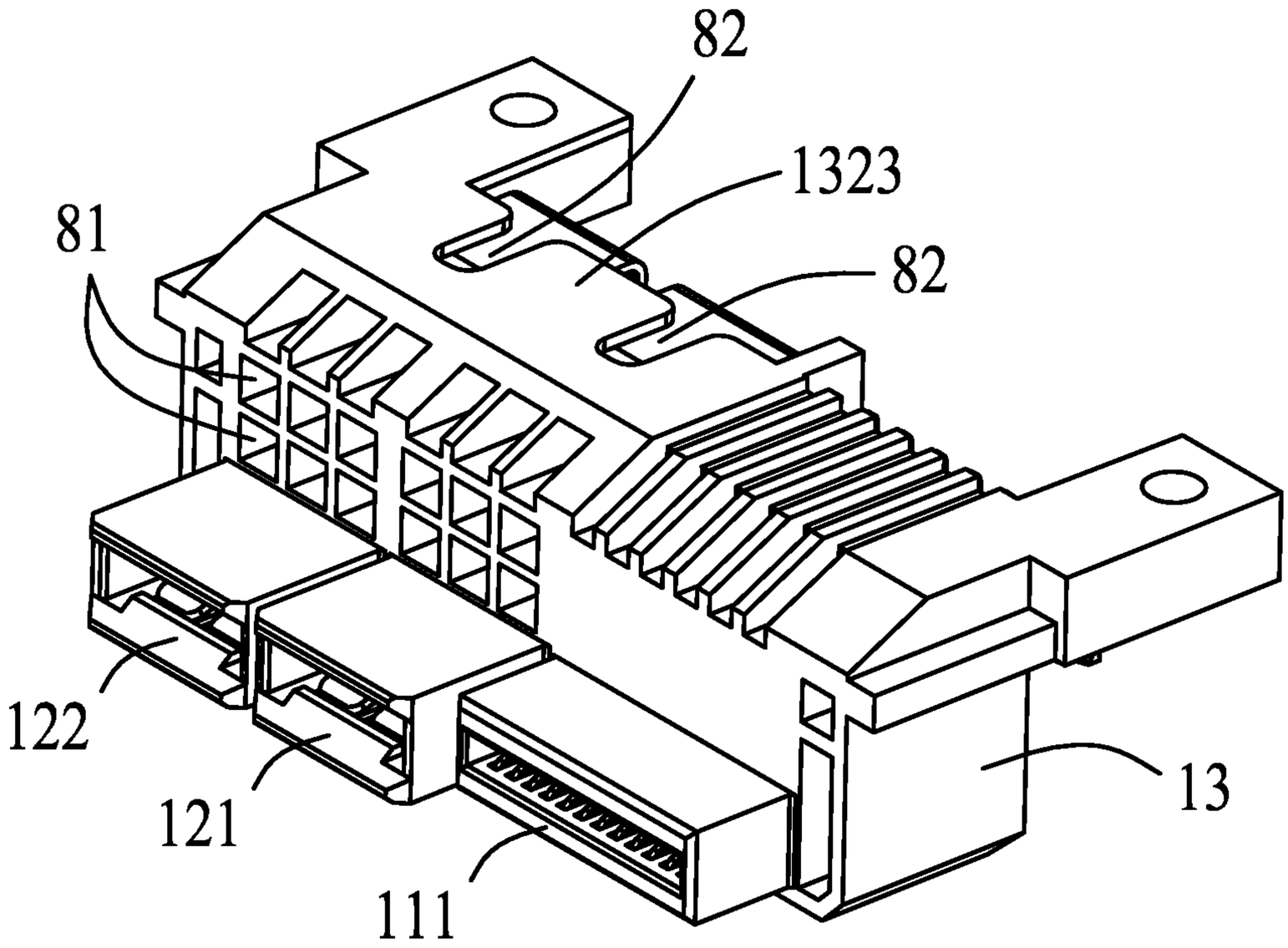

FIG. 18

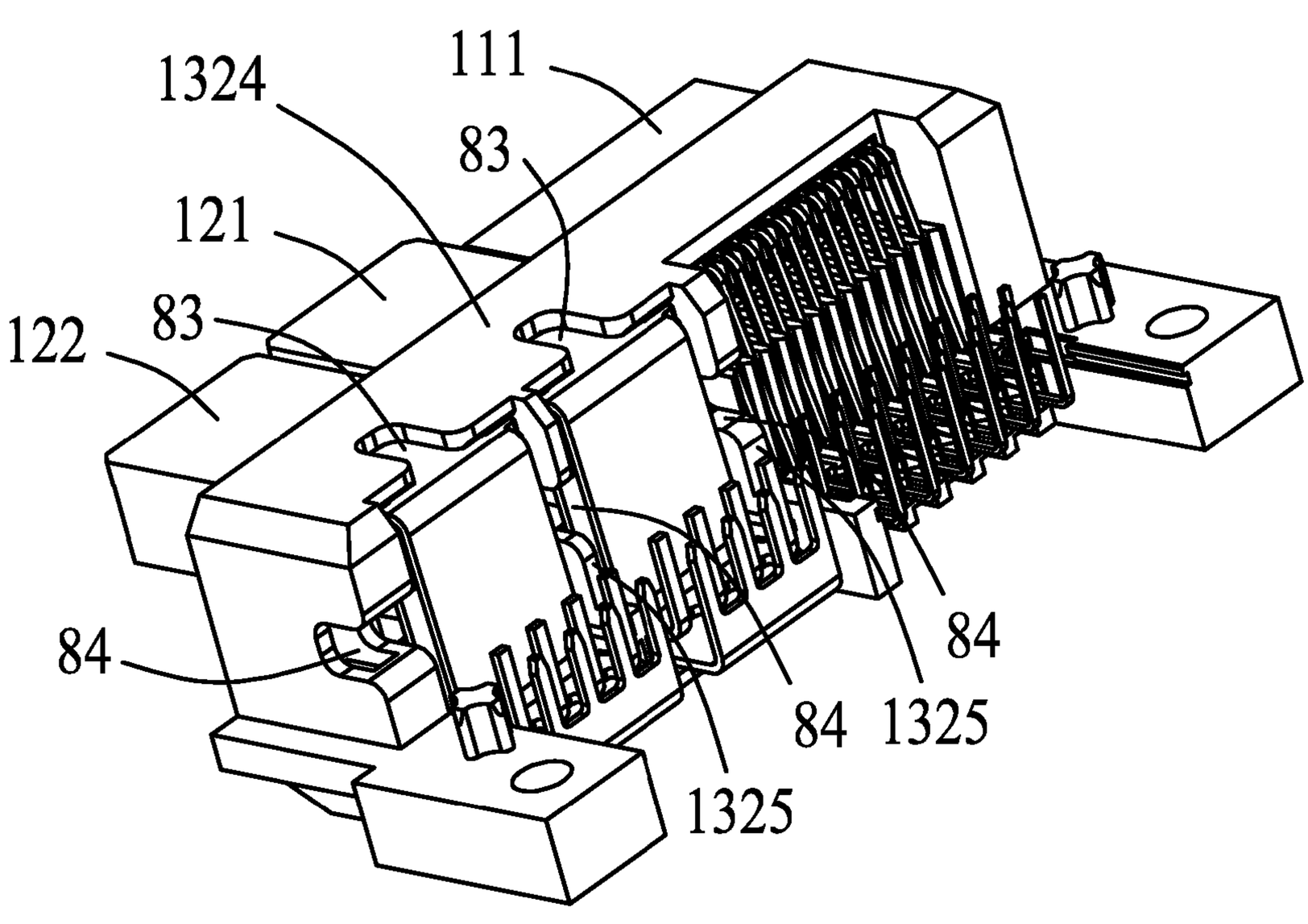

FIG. 19

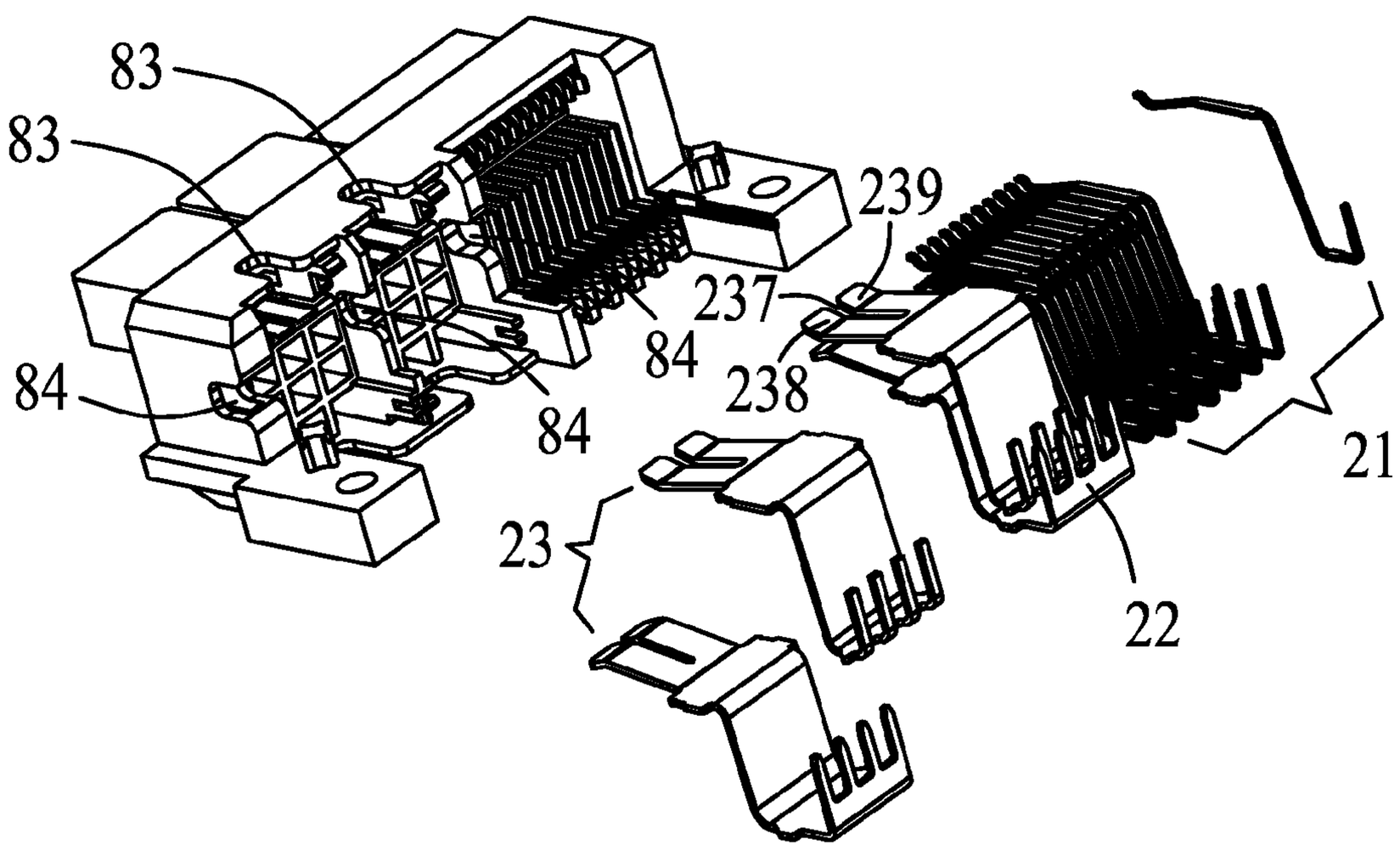

FIG. 20

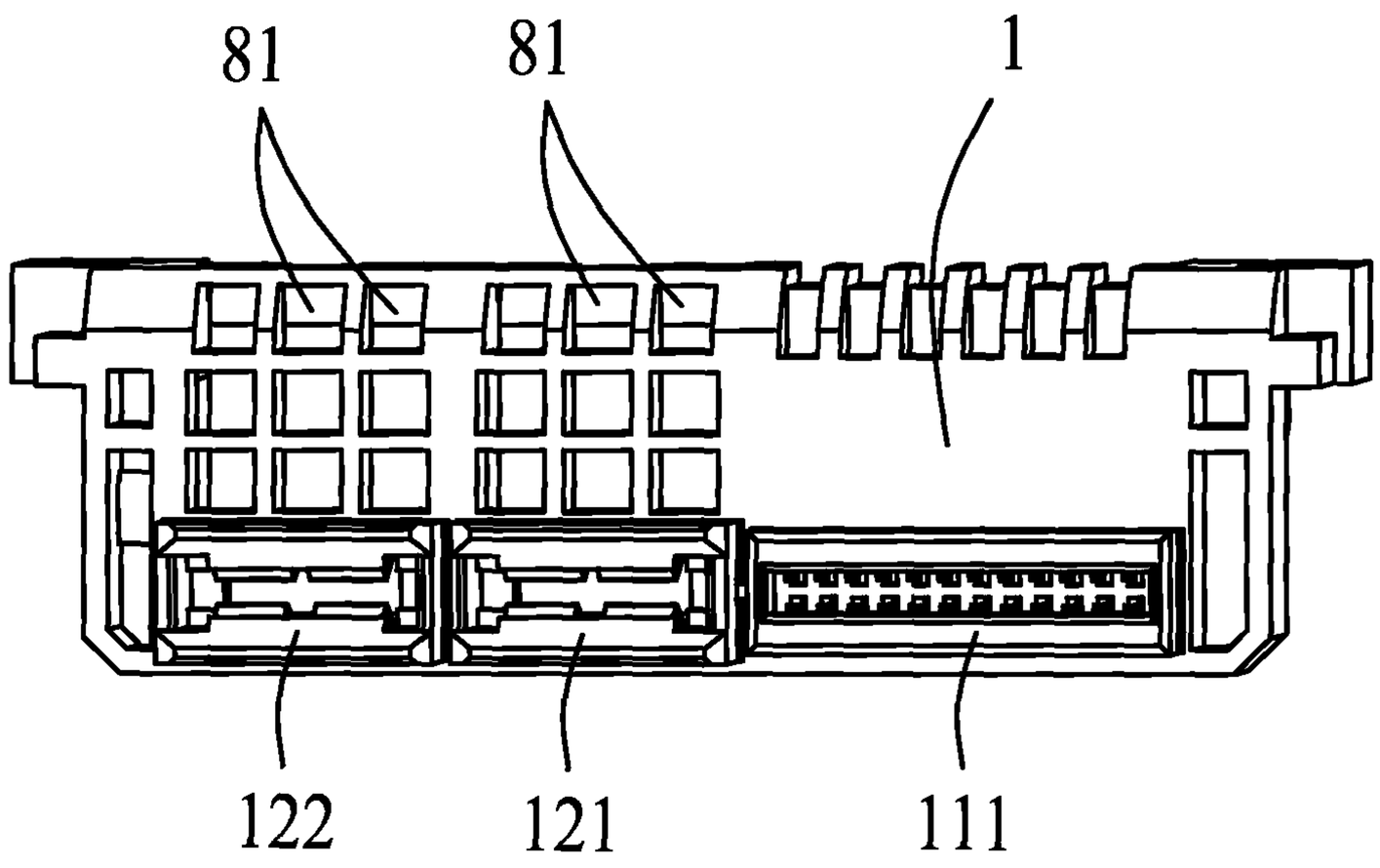

FIG. 21

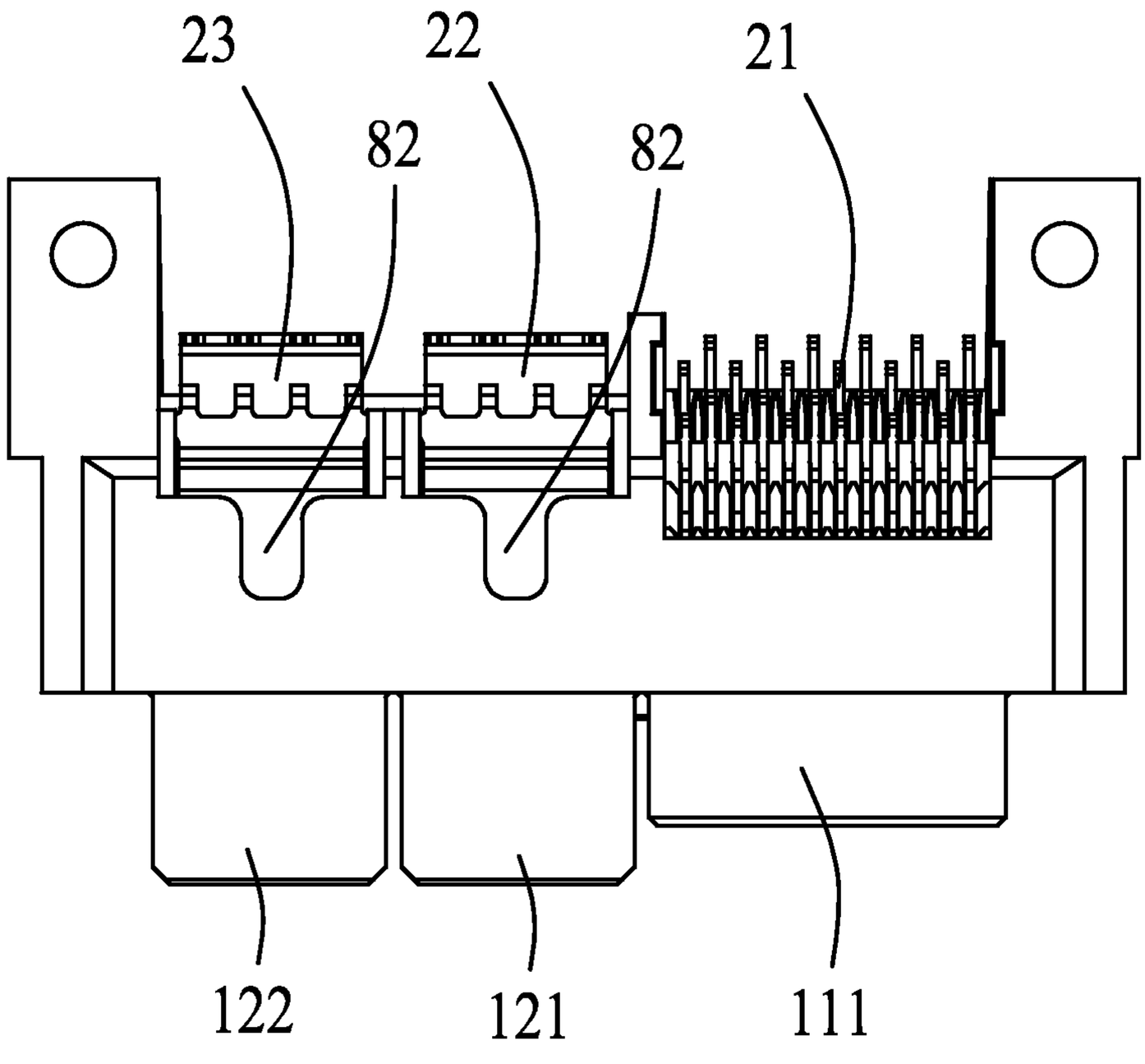

FIG. 22

ELECTRICAL CONNECTOR WITH ROBUST HEAT-DISSIPATION STRUCTURES

CROSS REFERENCE TO RELATED APPLICATIONS

The present application is a continuation-in-part of U.S. patent application Ser. No. 14/021,562 filed Sep. 9, 2013, which is incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an electrical connector, more particularly to an electrical connector mounted on a Printed Circuit Board (PCB).

2. Description of Related Art

With the miniaturization of electric products, electrical connectors with low-profile, high-current are adopted by customers gradually. The structures of conventional electrical connectors cannot fulfill the requirements of low-profile, and high-current. The height of the electrical connector is higher, the total height of an electronic product in which the electrical connector is assembled is higher. Hence, the inner space of the electronic product is limited by the height of the electrical connector, and cannot be designed and utilized flexibly. In addition, with the light and thin trend for electric products, how to utilize the limited space inside of the electrical product to position contacts of the electrical connector is a technical difficulty to be solved.

Besides, how to solve the heat-dissipation issue of such low-profile and high-current electrical connector is another technical challenge.

Hence, it is necessary to improve the conventional electrical connector to address problems mentioned above.

BRIEF SUMMARY OF THE INVENTION

The present disclosure provides an electrical connector including an insulative housing, two rows of signal contacts received in insulative housing, and two rows of power contacts received in insulative housing. The insulative housing includes a main body and a plurality of mating ports extending from the main body along a first direction. The main body includes a first main section and a second main section in a side-by-side arrangement. The mating ports include a first mating port extending from the first main section and a second mating port extending from the second main section. The first mating port defines a first receiving space and two rows of first receiving slots at upper and lower sides of the first receiving space. The first main section defines two rows of first receiving passages in alignment with the first receiving slots and two rows of first receiving channels located higher than the first receiving passages. The second mating port defines a second receiving space and two rows of second receiving slots at upper and lower sides of the second receiving space. The second main section defines two rows of second receiving passages in alignment with the second receiving slots and two rows of second receiving channels located higher than the second receiving passages.

Each row of the signal contacts includes a first mating portion protruding into the first receiving space, a first intermediate portion extending rearwardly from the first mating portion and a first termination portion bent downwardly from the first intermediate portion. The first intermediate portion is of a Z-shaped configuration and includes a first lower horizontal section received in corresponding first receiving passage, a first upper horizontal section received in corresponding first receiving channel, and a first connecting section connecting the first lower horizontal section and the first upper horizontal section.

Each row of the power contacts includes a second mating portion protruding into the second receiving space, a second intermediate portion extending rearwardly from the second mating portion and a second termination portion bent downwardly from the second intermediate portion. The second intermediate portion is of a Z-shaped configuration and includes a second lower horizontal section received in corresponding second receiving passage, a second upper horizontal section received in corresponding second receiving channel, and a second connecting section connecting the second lower horizontal section and the second upper horizontal section.

The second main section defines at least one first heat dissipation slot extending through the insulative housing along the first direction. The second connecting section is exposed to the at least one first heat dissipation slot along the first direction. The at least one first heat dissipation slot forms a first heat dissipation path. The second main section defines a second heat dissipation path in a second direction perpendicular to the first direction. The second upper horizontal section and/or the second lower horizontal section is exposed to the second heat dissipation path along the second direction. The second main section defines a third heat dissipation path in a third direction perpendicular to the first direction and the second direction. The second connecting section is exposed to the third heat dissipation path along the third direction. As a result, robust heat dissipation effect of the electrical connector can be achieved.

The foregoing has outlined rather broadly the features and technical advantages of the present invention in order that the detailed description of the invention that follows may be better understood. Additional features and advantages of the invention will be described hereinafter, which form the subject of the claims of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention, and the advantages thereof, reference is now made to the following descriptions taken in conjunction with the accompanying drawings, in which:

FIG. **1** is an assembled, perspective view of an electrical connector in accordance with the present invention;

FIG. **2** is a view similar to FIG. **1**, but from a different aspect;

FIG. **3** is a view similar to FIG. **1**, but from another different aspect;

FIG. **4** is an exploded, perspective view of the electrical connector in accordance with the present invention, with a Printed Circuit Board (PCB) shown together;

FIG. **5** is an exploded, perspective view of the electrical connector in accordance with the present invention;

FIG. **6** is a view similar to FIG. **5**, but from a different aspect;

FIG. **7** is a further exploded, perspective view of the electrical connector in accordance with the present invention;

FIG. **8** is a top view of FIG. **2**;

FIG. **9** is a front view of FIG. **2**;

FIG. **10** is a cross-sectional view of an insulative housing of the electrical connector in accordance of the present invention, with the PCB in a first position relative to the electrical connector;

FIG. **11** is a cross-sectional view of the insulative housing of the electrical connector in accordance of the present invention, with the PCB in a second position relative to the electrical connector;

FIG. **12** is a cross-sectional view of the electrical connector taken along line A-A in FIG. **8**;

FIG. **13** is a cross-sectional view of the electrical connector taken along line B-B in FIG. **8**;

FIG. **14** is a partially enlarged view of the insulative housing without first contacts assembled therein;

FIG. **15** is a partially enlarged view of the insulative housing with the first contacts partially assembled therein;

FIG. **16** is a partially enlarged view of the insulative housing with the first contacts fully assembled therein;

FIG. **17** is a partially enlarged view of the insulative housing before second contacts assembled therein;

FIG. **18** is an assembled, perspective view of an electrical connector in accordance with another embodiment of the present invention;

FIG. **19** is another perspective view of FIG. **18**;

FIG. **20** is an exploded view of FIG. **19**;

FIG. **21** is a front view of FIG. **18**; and

FIG. **22** is a top view of FIG. **18**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the following description, numerous specific details are set forth to provide a thorough understanding of the present invention. However, it will be obvious to those skilled in the art that the present invention may be practiced without such specific details. In other instances, well-known circuits have been shown in block diagram form in order not to obscure the present invention in unnecessary detail. For the most part, details concerning timing considerations and the like have been omitted inasmuch as such details are not necessary to obtain a complete understanding of the present invention and are within the skills of persons of ordinary skill in the relevant art.

Reference will be made to the drawing figures to describe the present invention in detail, wherein depicted elements are not necessarily shown to scale and wherein like or similar elements are designated by same or similar reference numeral through the several views and same or similar terminology.

Please refer to FIGS. **1-9**, an electrical connector **100** in accordance with the present invention is used to be assembled to a Printed Circuit Board (PCB) and form an electrical connection with a complementary device **300**. The electrical connector **100** comprises an insulative housing **1** and a plurality of contacts **2** assembled in the insulative housing **1**. The electrical connector **100** in accordance with the present invention is an electrical connector of low-profile and high-current.

The contacts **2** are grouped into a group of first contacts **21**, a group of second contacts **22** and a group of third contacts **23**. The group of first contacts **21** is divided and arranged into two rows of signal contacts, a row of upper first contacts **210** and a row of lower first contacts **212**. The group of second contacts **22** comprises a pair of power contacts which comprise an upper second contact **220** and a lower second contact **222**. The group of third contacts **23** is identical as the group of second contacts **22** and also comprises an upper third contact **230** and a lower third contact **232**.

Please refer to FIGS. **10-17**, the insulative housing **1** comprises a common main body **13**, a first mating port **111**, a second mating port **121**, and a third mating port **122** extending forwardly from a center section of the common main body **13**. The first mating port **111**, the second mating port **121** and the third mating port **122** are arranged side by side, and the second mating port **121** and the third mating port **122** are identical. For describing the present invention more clearly, the common main body **13** is also divided as a first main section **131** corresponding to the first mating port **111**, a second main section **132** corresponding to the second mating port **121**, and a third main section **133** corresponding to the third mating port **122**. The first mating port **111** has a front first mating surface **11**, the second and third mating ports **121**, **122** has a second mating surface **12** which is located before the first mating surface **11** along a mating direction of the electrical connector **100** with the complementary device **300**.

The first main section **131** is of L-shape with a first stretch section **1310** extending rearward from an upper section thereof to make the first main section **131** L-shape. Thus, the first main section **131** has a first rear surface **14** and a second rear surface **15** on the first stretch section **1310** with the first rear surface **14** closer to the first mating surface **11** than the second rear surface **15**. The first mating port **111** defines a first receiving space **1110** and two rows of first receiving slots **1111** in opposite upper and lower walls thereof and both facing to the first receiving space **1110**. The first main section **131** defines two rows of first receiving passages **1311** arranged along a height direction of the first main section **131** and respectively aligning with the two rows of first receiving slots **1111**, and two rows of first receiving channels **1312** in the first stretch section **1310** arranged along a height direction of the first stretch section **1310**.

The second main section **132** is of L-shape with a second stretch section **1320** extending rearward from an upper section thereof to make the second main section **132** L-shape. The second mating port **121** defines a second receiving space **1210** and two rows of second receiving slots **1211** in opposite upper and lower walls thereof and both facing to the second receiving space **1210**. The second main section **132** defines two rows of second receiving passages **1321** arranged along a height direction of the second main section **132** and respectively aligning with the two rows of second receiving slots **1211**, and two rows of second receiving channels **1322** in the second stretch section **1320** arranged along a height direction of the second stretch section **1320**.

The third main section **133** and the third mating port **122** have the identical structures as that of the second main section **132** and the second mating port **121**. The third main section **133** is of L-shape with a third stretch section **1330** extending rearward from an upper section thereof to make the third main section **133** L-shape. The third mating port **122** defines a third receiving space **1220** and two rows of second receiving slots **1221** in opposite upper and lower walls thereof and both facing to the third receiving space **1220**. The third main section **133** defines two rows of third receiving passages **1331** arranged along a height direction of the third main section **133** and respectively aligning with the two rows of third receiving slots **1221**, and two rows of third receiving channels **1332** in the third stretch section **1330** arranged along a height direction of the third stretch section **1330**.

In the preferred embodiment of the present invention, the electrical connector **100** is a sink-type electrical connector for achieving low-profile. A pair of mounting sections **17** is formed at opposite lateral ends of the insulative housing **1** and respectively near to the first stretch section **1310** and the third stretch section **1330** for interferentially engaging with the PCB **200**. A bottom surface **170** of the mounting sections **17** is served as a mounting surface which is higher than a bottom surface of the first mating port **111**.

Each upper first contact **210** comprises a first mating portion **213** with a curved first contacting end **2130** bent toward

the first receiving space **1110** for electrically connecting with the complementary device **300**, a Z-shape first intermediate portion **214** extending rearward from the first mating portion **213**, and a first termination portion **215** bent downward from a free end of the first intermediate portion **214** for electrically connecting with the PCB **200**. The first intermediate portion **214** comprises a first lower horizontal section **2141** connecting with the first mating portion **213**, a first upper horizontal section **2143** higher than and parallel to the first lower horizontal section **2141** and connecting with the first termination portion **215**, and an inclined first connecting section **2142** connecting with the first lower horizontal section **2141** and the first upper horizontal section **2143**. The first mating port **111** is located between the first upper horizontal section **2143** and the first lower horizontal section **2141** in the height direction.

The first lower horizontal section **2141** is widened on both opposite lateral sides to form a flat first lower widened section **2144** for interferentially engaging with the first receiving passage **1311** defined in the first main section **131**. The first upper horizontal section **2143** is partially widened on both lateral sides to form a flat first upper widened section **2145** for interferentially engaging with the first receiving channel **1312** in the first stretch section **1310**. Such a Z-shape intermediate portion **214** could satisfy mounting requirements of a low-profile electrical connector. In addition, since the first contact **21** is relatively long, the first lower widened section **2144** and the first upper widened section **2145** could provide more support to the first contact **21** via the engagement with the first receiving passage **1311** and the first receiving channel **1312**. In an alternative embodiment, the widened sections **2144**, **2145** also could be barbs. The first rear surface **14** forms a plurality of guiding ribs **141** with inclined guiding surfaces **142** between two adjacent first receiving passages **1311** for guiding the insertion of the upper and lower first contacts **210**, **212** from a back-to-front direction.

Each lower first contacts **212** has the substantially the same structure as that of the upper first contacts **210**, except the curved directions of the first contacting ends **2130** are opposite to each other, and both toward the first receiving space **1110**, and the lengths of the first connecting section **2142** and the first lower horizontal section **2141** of the lower first contact **212** is longer than that of the first connecting section **2142** and the first lower horizontal section **2141** of the upper first contact **210**, while the length of the first upper horizontal section **2143** of the lower first contact **212** is shorter than that of the first upper horizontal section **2143** of the upper first contact **210**. Thus, the shorter first termination portion **215** of the lower first contact **212** is located in front of the longer first termination portion **215** of the upper first contact **210**. In summary, the pair of the first mating portions **213** are arranged symmetrically and received in the pair of first receiving slots **1111** of the first mating port **111**, while the other structure of the upper and lower first contacts **210**, **212** are parallel to one another, with the lower first contact **212** beneath the upper first contact **210**. The first termination portions **215** of the upper and lower first contacts **210**, **212** are arranged into four rows and pass through a plurality of holes defined in a spacer **3** for being connected to the PCB **200**.

Each second contact **22** is much wider than the first contact **21** for satisfying high-current transmission requirements. Each upper second contacts **220** comprises a second mating portion **223** with a curved second contacting end **2230** bent toward the second receiving space **1210** for electrically connecting with the complementary device **300**, a Z-shape second intermediate portion **224** extending rearward from the second mating portion **223**, and a second termination portion **225** bent downward from a free end of the second intermediate portion **224** for electrically connecting with the PCB **200**. The second intermediate portion **224** comprises a second lower horizontal section **2241** connecting with the second mating portion **223**, a second upper horizontal section **2243** higher than and parallel to the second lower horizontal section **2241** and connecting with the second termination portion **225**, and an inclined second connecting section **2242** connecting with the second lower horizontal section **2241** and the second upper horizontal section **2243**. The second termination portion **225** is bifurcated to form four legs for being soldered with the PCB **200**.

The second lower horizontal section **2241** is partially widened on both opposite lateral sides to form a flat second lower widened section **2244** for interferentially engaging with the second receiving passage **1321** defined in the second main section **132**. The second upper horizontal section **2243** is partially widened on both lateral sides to form a flat second upper widened section **2245** for interferentially engaging with the second receiving channel **1322** in the second stretch section **1320**. In the preferred embodiment of the present invention, the two opposite sides of the second lower widened section **2244** are formed with a plurality of barbs for retaining the second contact **22** in the insulative housing **1** more stably. The two opposite sides of the second upper widened section **2245** are flat for being assembled conveniently.

Each lower second contacts **222** has the substantially the same structure as that of the upper second contacts **220**, except the curved directions of the second contacting ends **2230** are opposite to each other, and both toward the second receiving space **1210**, and the lengths of the second connecting section **2242** and the second lower horizontal section **2241** of the lower second contact **222** is longer than that of the second connecting section **2242** and the second lower horizontal section **2241** of the upper second contact **220**, while the length of the second upper horizontal section **2243** of the lower second contact **222** is shorter than that of the second upper horizontal section **2243** of the upper second contact **220**. Thus, the shorter second termination portion **225** of the lower second contact **222** is located in front of the longer second termination portion **225** of the upper second contact **220**. In summary, the pair of second mating portions **223** are arranged symmetrically and received in the pair of second receiving slots **1211** of the second mating port **121**, while the other structure of the upper and lower second contacts **220**, **222** are parallel to one another, with the lower second contact **222** beneath the upper second contact **220**.

The group of third contacts **23** have the identical structures and arrangements as those of the group of second contacts **22**. Each third contact **23** is much wider than the first contact **21** for satisfying high-current transmission requirements. Each upper third contacts **230** comprises a third mating portion **233** with a curved third contacting end **2330** bent toward the third receiving space **1220** for electrically connecting with the complementary device **300**, a Z-shape third intermediate portion **234** extending rearward from the third mating portion **233**, and a third termination portion **235** bent downward from a free end of the third intermediate portion **234** for electrically connecting with the PCB **200**. The third intermediate portion **234** comprises a third lower horizontal section **2341** connecting with the third mating portion **233**, a third upper horizontal section **2343** higher than and parallel to the third lower horizontal section **2341** and connecting with the third termination portion **235**, and an inclined second connecting section **2242** connecting with the second lower horizontal section **2241** and

the second upper horizontal section **2243**. The second termination portion **225** is bifurcated to form four legs for being soldered with the PCB **200**.

The third lower horizontal section **2341** is partially widened on both opposite lateral sides to form a flat third lower widened section **2344** for interferentially engaging with the third receiving passage **1331** defined in the third main section **133**. The third upper horizontal section **2343** is partially widened on both lateral sides to form a flat third upper widened section **2345** for interferentially engaging with the third receiving channel **1332** in the third stretch section **1330**. In the preferred embodiment of the present invention, the two opposite sides of the third lower widened section **2344** are formed with a plurality of barbs for retaining the third contact **23** in the insulative housing **1** more stably. The two opposite sides of the third upper widened section **2345** are flat for being assembled conveniently.

Each lower third contacts **232** has the substantially the same structure as that of the upper third contacts **230**, except the curved directions of the third contacting ends **2330** are opposite to each other, and both toward the third receiving space **1310**, and the lengths of the third connecting section **2342** and the third lower horizontal section **2341** of the lower third contact **232** is longer than that of the third connecting section **2342** and the third lower horizontal section **2341** of the upper third contact **230**, while the length of the third upper horizontal section **2343** of the lower third contact **232** is shorter than that of the third upper horizontal section **2343** of the upper third contact **230**. Thus, the shorter third termination portion **235** of the lower third contact **232** is located in front of the longer third termination portion **235** of the upper third contact **230**. In summary, the pair of third mating portions **233** are arranged symmetrically and received in the pair of third receiving slots **1221** of the third mating port **122**, while the other structure of the upper and lower second contacts **230**, **232** are parallel to one another, with the lower third contact **232** beneath the upper third contact **220**.

Referring to FIGS. **18** to **21**, in a second embodiment of the present disclosure, the insulative housing **1** defines a first heat dissipation path extending along a first direction (i.e., a front-to-back direction), a second heat dissipation path extending along a second direction (i.e., a top-to-bottom direction) perpendicular to the first direction, and a third heat dissipation path extending along a third direction (i.e., a left-to-right direction) perpendicular to the first direction and the second direction. The first heat dissipation path, the second heat dissipation path and the third heat dissipation path are surrounding the second contacts **22** and the third contacts **23** for heat dissipation.

According to the illustrated embodiment of the present disclosure, the second main section **132** defines a plurality of first heat dissipation slots **81** extending through the insulative housing **1** along the first direction. The first heat dissipation slots **81** are in matrix arrangement. As shown in FIG. **21**, the second connecting sections **2242** are exposed to the first heat dissipation slots **81** along the first direction. The first heat dissipation slots **81** form the first heat dissipation path.

As shown in FIGS. **18** to **22**, the second main section **132** includes a top wall **1323** and a bottom wall **1324**. The top wall **1323** defines a top cutout **82** extending threrethrough along the second direction. The second upper horizontal section **2243** is exposed to the top cutout **82** for heat dissipation. The bottom wall **1324** defines a bottom cutout **83** extending threrethrough along the second direction. The second lower horizontal section **2244** is exposed to the bottom cutout **83** for heat dissipation. The top cutout **82** and the bottom cutout **83** are in alignment with each other along the second direction. The top cutout **82** and the bottom cutout **83** extend through the top wall **1323** and the bottom wall **1324** in the first direction, respectively. The top cutout **82** and the bottom cutout **83** form the second heat dissipation path.

As shown in FIG. **19**, the insulative housing **1** includes two side ribs **1325** extending rearwardly therefrom. The second connecting sections **2242** are located between the two side ribs **1325**. Each side rib **1325** defines a rear cutout **84** in order to form the third heat dissipation path. As a result, robust heat dissipation effect of the electrical connector **100** can be achieved. The third main section **133** is provided with a similar structure shown in the FIGS. **18** to **22** corresponding to the third contacts **23** detailed description of which is omitted herein.

As shown in FIG. **20**, as shown in the second embodiment of the present disclosure, each of the second mating portions **223** and third mating portions **233** defines a slit **237** extending through a distal end thereof along the first direction. Each of the second mating portions **223** and third mating portions **233** is divided into two elastic portions **238**, **239** by the slit **237** in order to improve stability in mating with a complementary connector.

It is to be understood, however, that even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed. For example, the tongue portion is extended in its length or is arranged on a reverse side thereof opposite to the supporting side with other contacts but still holding the contacts with an arrangement indicated by the broad general meaning of the terms in which the appended claims are expressed.

We claim:

1. An electrical connector comprising:

an insulative housing comprising a main body and a plurality of mating ports extending from the main body along a first direction, the main body comprising a first main section and a second main section in a side-by-side arrangement, the mating ports comprising a first mating port extending from the first main section and a second mating port extending from the second main section; the first mating port defining a first receiving space and two rows of first receiving slots at upper and lower sides of the first receiving space, the first main section defining two rows of first receiving passages in alignment with the first receiving slots and two rows of first receiving channels located higher than the first receiving passages; the second mating port defining a second receiving space and two rows of second receiving slots at upper and lower sides of the second receiving space, the second main section defining two rows of second receiving passages in alignment with the second receiving slots and two rows of second receiving channels located higher than the second receiving passages;

two rows of signal contacts received in the first main section and the first mating port, each row of the signal contacts comprising a first mating portion protruding into the first receiving space, a first intermediate portion extending rearwardly from the first mating portion and a first termination portion bent downwardly from the first intermediate portion, the first intermediate portion being of a Z-shaped configuration and comprising a first lower horizontal section received in corresponding first receiv-

ing passage, a first upper horizontal section received in corresponding first receiving channel, and a first connecting section connecting the first lower horizontal section and the first upper horizontal section;

two rows of power contacts received in the second main section and the second mating port, each row of the power contacts comprising a second mating portion protruding into the second receiving space, a second intermediate portion extending rearwardly from the second mating portion and a second termination portion bent downwardly from the second intermediate portion, the second intermediate portion being of a Z-shaped configuration and comprising a second lower horizontal section received in corresponding second receiving passage, a second upper horizontal section received in corresponding second receiving channel, and a second connecting section connecting the second lower horizontal section and the second upper horizontal section; wherein

the second main section defines at least one first heat dissipation slot extending through the insulative housing along the first direction, the second connecting section being exposed to the at least one first heat dissipation slot along the first direction, the at least one first heat dissipation slot forming a first heat dissipation path.

2. The electrical connector as claimed in claim **1**, wherein the second main section defines a second heat dissipation path in a second direction perpendicular to the first direction, the second upper horizontal section and/or the second lower horizontal section being exposed to the second heat dissipation path along the second direction.

3. The electrical connector as claimed in claim **2**, wherein the second main section defines a third heat dissipation path in a third direction perpendicular to the first direction and the second direction, the second connecting section being exposed to the third heat dissipation path along the third direction.

4. The electrical connector as claimed in claim **3**, wherein the first lower horizontal sections are interferentially received in corresponding first receiving passages, the first upper horizontal sections are interferentially received in corresponding first receiving channels, the second lower horizontal sections are interferentially received in corresponding second receiving passages, and the second upper horizontal sections are interferentially received in corresponding second receiving channels.

5. The electrical connector as claimed in claim **3**, wherein the main body comprises a mounting surface for being assembled to a printed circuit board, the mounting surface being positioned higher than the first mating port.

6. The electrical connector as claimed in claim **3**, wherein at least one of the second mating portions defines a slit extending through a distal end thereof along the first direction, the at least one of the second mating portions being divided into two elastic portions by the slit in order to improve stability in mating with a complementary connector.

7. The electrical connector as claimed in claim **3**, wherein the second main section defines a plurality of the first heat dissipation slots in matrix arrangement.

8. The electrical connector as claimed in claim **3**, wherein the second main section comprises a top wall, the second heat dissipation path comprising a top cutout extending through the top wall along the second direction, the second upper horizontal section being exposed to the top cutout for heat dissipation.

9. The electrical connector as claimed in claim **3**, wherein the insulative housing comprises two side ribs extending rearwardly therefrom, the second connecting sections being located between the two side ribs, each side rib defining a rear cutout in order to form the third heat dissipation path.

10. The electrical connector as claimed in claim **8**, wherein the second main section comprises a bottom wall, the second heat dissipation path comprising a bottom cutout extending through the bottom wall along the second direction, the second lower horizontal section being exposed to the bottom cutout for heat dissipation.

11. The electrical connector as claimed in claim **10**, wherein the top cutout and the bottom cutout are in alignment with each other along the second direction.

12. The electrical connector as claimed in claim **10**, wherein the top cutout and the bottom cutout extend through the top wall and the bottom wall in the first direction, respectively.

13. An electrical connector comprising:

an insulative housing comprising a main body and a mating port extending from the main body, the mating port defining a receiving space and two rows of receiving slots at upper and lower sides of the receiving space, the main body defining two rows of receiving passages in alignment with the receiving slots and two rows of receiving channels located higher than the receiving passages;

two rows of power contacts received in the main body and the mating port, each row of the power contacts comprising a mating portion protruding into the receiving space, an intermediate portion extending rearwardly from the mating portion and a termination portion bent downwardly from the intermediate portion, the intermediate portion being of a Z-shaped configuration and comprising a lower horizontal section received in corresponding receiving passage, an upper horizontal section received in corresponding receiving channel, and a connecting section connecting the lower horizontal section and the upper horizontal section; wherein

the insulative housing defines a first heat dissipation path extending along a front-to-back direction.

14. The electrical connector as claimed in claim **13**, wherein the insulative housing defines a second heat dissipation path extending along a second direction perpendicular to the front-to-back direction, and a third heat dissipation path extending along a third direction perpendicular to the front-to-back direction and the second direction, the first heat dissipation path, the second heat dissipation path and the third heat dissipation path being surrounded the power contacts for heat dissipation.

15. The electrical connector as claimed in claim **14**, wherein the main body comprises a mounting surface for being assembled to a printed circuit board, the mounting surface being positioned higher than the mating port.

16. The electrical connector as claimed in claim **14**, wherein each mating portion defines a slit extending through a distal end thereof along the first direction, each mating portions being divided into two elastic portions by the slit in order to improve stability in mating with a complementary connector.

17. The electrical connector as claimed in claim **14**, wherein the insulative housing defines a plurality of the first heat dissipation slots in matrix arrangement.

18. The electrical connector as claimed in claim **14**, wherein the main body comprises a top wall, the second heat dissipation path comprising a top cutout extending through the top wall along the second direction, the upper horizontal section being exposed to the top cutout for heat dissipation.

19. The electrical connector as claimed in claim **18**, wherein the main body comprises a bottom wall, the second

heat dissipation path comprising a bottom cutout extending through the bottom wall along the second direction, the lower horizontal section being exposed to the bottom cutout for heat dissipation, the top cutout and the bottom cutout being in alignment with each other along the second direction.

20. The electrical connector as claimed in claim **18**, wherein the main body comprises two side ribs extending rearwardly therefrom, the power contacts being located between the two side ribs, each side rib defining a rear cutout in order to form the third heat dissipation path.

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